

THE DIPTERA OF THE TERRITORY OF NEW GUINEA. XIV.*

FAMILY TABANIDAE. PART III. TABANINAE.

By H. OLDROYD, M.A., F.R.E.S.

*British Museum (Natural History), London.**(Communicated by Dr. G. A. M. Heydon.)*

(Seventy-one Text-figures.)

[Read 29th September, 1948.]

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INTRODUCTION.

This part concludes the review of the Tabanidae of New Guinea, begun by the late Mr. F. H. Taylor in these PROCEEDINGS (1946) and continued by me (1947). In addition to the material detailed in my previous paper, I have had small collections lent for study by Dr. J. Bequaert of Harvard, Mr. D. J. Lee of Sydney, N.S.W., and by the South Australian Museum, to all of whom I am most grateful for this co-operation. Dr. Max Beier, of the Naturhistorisches Museum, Vienna, very kindly allowed me to borrow the types of *T. furunculigenus* Dol. and *T. cinnamoneus* Dol., both of which had been described later under different names.

In the previous part of this paper I made one or two errors in location of type specimens. The following are in the Museum of *Natura Artis Magistra*, Amsterdam, and not in the Rijksmuseum of Natural History, Leyden, as stated: *Pareucompsa femoralis* Ric.; *Lilaea de meijerei* Ric.; *Lilaea vittata* Ric.; *Scaptia novaeguineensis* Ric.

The exact positions of the various camps of the Archbold Expedition were given in my previous paper. Those of the Lorentz Expedition of 1909-10—Bivak Island, etc.—are in the general region of the Lorentz River in S.W. New Guinea, about 05°S., 138-139°E. One locality where Mr. W. Stüber collected is given on labels as "Hollandia, 140°E., 3°10'S."; this is a place about 60 miles S.W. of Hollandia, near the headwaters of the Idenburg River, at about 1,500 ft.

With the exception of *T. yulensis* v. Röder, and three species described by Doleschall, all the known species of Tabaninae are described and figured in Schuurmans Stekhoven's valuable work on the Tabanidae of the Dutch East Indian Archipelago, but they are scattered among the oriental species, and the grouping is not one that I can

* Continued from these PROCEEDINGS, lxxii, 1947, 142.

follow. Since I have re-grouped the species I have also re-described them, very briefly, where I have material available. Certain points are omitted from the descriptions where there is uniformity throughout—e.g., the proboscis is not mentioned where it is moderately short, with fleshy labella occupying about half the total length; and if the coxae are not described, they should be assumed to agree with the adjoining pleura in tomentum and colour.

There is very much variation in details of coloration, and the proportions of frons and callus are relied upon as final arbiter in deciding between two different species. For this reason, and because secondary sexual differences often make it difficult to associate males and females with certainty, I have given little attention to males. The figures quoted as "frons proportions" are the readings of a micrometer eyepiece between the eyes at the vertex, at the antennal angles, and the length of the frons from vertex to antennal angles. The frons is said to diverge if it becomes broader towards the antennae, and to converge if it narrows towards the antennae. "Index" is length of frons divided by breadth at antennal angles.

I have again used some generic names from Enderlein's "Neues Tabanidensystem" of 1922, 1925. These groupings have been adversely criticized because the keys make use of variable characters, particularly of the venation, but it is becoming clear that many of Enderlein's group-concepts have a real basis. The difficulty is to re-define them on more constant characters.

SUBFAMILY TABANINAE.

The classification of this, much the larger, subfamily is chaotic. In every region there are one or two isolated species for which a genus can, with confidence, be erected, and there are many groups of species that can be recognized in collections by their general appearance and pattern. When one tries to find key-characters to separate these groups there are so many intermediates that authors usually end by dumping most of the species into the genus 'Tabanus'. Groups of species are then defined within this complex.

Schuermans Stekhoven (1926)* uses the colour and pattern of the abdomen as his main group-character. This has to be done eventually, but it is better to use structural characters as far as they will go. In recent years Philip and other North American workers have made use of the basicosta, or *subepaulet* (Text-fig. 1). In the New Guinea species this gives a convenient, apparently sound division. Nearly all those with a hairy subepaulet have a very narrow frons, tapering towards the antennae; these are the most 'Tabanus-like' forms, and are here referred to the genus *Tabanus*. This element seems to be most nearly allied to the genotype, the European *T. bovinus* L., which also has hairy subepaulets, though a somewhat broader frons.

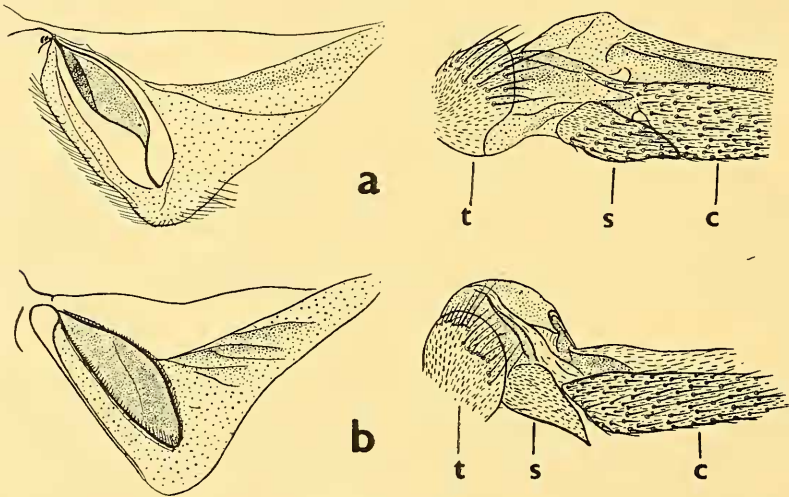
The New Guinea Tabaninae with bare subepaulets are more diverse in form, but nearly all have a broader and less tapering frons. Besides several distinctive genera, such as *Neobolbodimyia*, there are a number of species-groups of distinctive appearance. A number of very small forms are, I believe, peculiar to the New Guinea fauna, and have been separated off by Enderlein as his subfamily Chasmiinae, containing two genera, *Chasmia* and *Chasmiella*. While it is difficult to separate off this group on any one character, in the aggregate of a number of small points it seems distinctive, and the two genera are here accepted. Two species—*fasciata* and *parvicallusa*, n. spp.—are rather anomalous. I have included them in the genus *Chasmiella*, but they differ markedly from the other species. In some ways they are intermediate between *Chasmiella* and *Chalybosoma*, g.n.

* It should be noted that Stekhoven uses the term 'Pteropleuron' for the callus which lies immediately before the transverse suture on each side of the thorax, and which is very prominent in Tabanidae. This should properly be called the *notopleural* callus, or lobe, and the term pteropleuron applied to the pleural sclerite immediately below the wing-base. This is a point to beware of in using Stekhoven's descriptions.

The remaining groups of species with bare sub-epaulets are retained in one genus though eventually some of them—e.g., the yellow, patternless forms centring round *T. sol* S.S.—will probably have to be referred to genera which are present in adjoining regions. Since the genotype of Taylor's genus *Cydistomyia* comes in this section I have used this as the generic name, while fully realizing that this grouping brings together many diverse elements, and that the genotype itself is rather an isolated species.

Mr. G. H. Hardy was good enough to send me a synopsis of his forthcoming paper on Australian *Tabanus*, in which he uses the name *Cydistomyia* for a subgenus. He uses the frontal index as a primary character, and draws his dividing line in a different place from mine, so that he includes *Cydistomyia* in the forms with a narrow frons (i.e., my genus *Tabanus*), and reserves the name *Tabanus* for a few species with two separate frontal calli. I hesitate to quote from his unpublished work, and do so merely to point out that his '*Cydistomyia*' may not cover the same group of species as mine.

A character often associated with the hairy subepaulet is the possession of a pair of prominent lips to the thoracic spiracles (Text-fig. 1), while in most species with bare subepaulet the spiracle does not protrude outside the pleural wall. This association is



Text-figure 1.

Prothoracic spiracle and base of wing: *a*, *Tabanus angustilineatus*, n. sp.; *b*, *Cydistomyia aluensis*, n. sp., showing t = tegula; s = subepaulet; c = costal vein.

not invariable, and the appearance may sometimes be altered during the process of drying, but there seems to be a strong correlation. I have seen many species from other regions which follow the same rule, though there are notable exceptions, in the Palaearctic Region. Certain Mediterranean species, such as *T. apricus* Mg., and *T. graecus* Fabr. have a bare subepaulet and a spiracle with lips.

In a recent paper Hassan (1944), *Trans. R. ent. Soc. Lond.*, 94, 103-153, has described two forms of spiracle-regulating mechanism which resemble these. He associates the lipped (or external) type with a humid environment, and the lipless (or internal) type with drought. It would be interesting if the habitats of these Tabanidae showed such a correlation.

DISTRIBUTION.

Unlike the Pangoniinae, the Tabaninae in the collections before me do not show any marked features of distribution. There are one or two coastal species (*T. rufinotatus* Big., *Cydistomyia caesioides* Wlk., perhaps *Chasmiella papouinus* Wlk.) and a few have spread into New Guinea from other regions. *T. ceylonicus* Schin. extends from Ceylon south-eastwards, and is nearing the end of its range in New Guinea. The smaller

Cydistomyia, immigrans, inopinata, misimensis, n. spp., seem to be a spread into Papua of Australian elements. The *cohaerens*-group of *Tabanus* also extends into Australasia, and, in New Guinea, seems to occur mainly at the lower altitudes. Beyond this, the distribution of species seems to be an individual matter, and, as at present known, is largely an accident of collecting.

KEY TO GENERA OF TABANINAE OCCURRING IN NEW GUINEA.

Hind tibiae without spurs; ocelli sometimes present, more often vestigial or absent.

(Genera in italics have not been seen by me; those in square brackets are not yet known from New Guinea.)

1. Subepaulet (basicosta) with bristly hairs as well-developed as those on the costal vein (Text-fig. 1a). Thoracic spiracles, especially the anterior ones, generally with prominent lips, which protrude above the general level of the pleura (Text-fig. 1a). Frons very narrow (index 5-10), tapering towards antennae *Tabanus* Linn.
- Subepaulet (basicosta) with a velvety pubescence, but without bristly hairs, thereby contrasting in appearance with costal vein (Text-fig. 1b). Thoracic spiracles generally protruding little or not at all above the level of pleura, without prominent lips (Text-fig. 1b). Frons usually—but not invariably—broader and not so tapering 2
2. Labella of proboscis short, not more than one-third of total length of proboscis. Anal cell usually open, or barely closed. Median ocellus present, some distance before vertex, which is generally deeply grooved. Antennae usually more or less elongate, first segment rather longer than broad, third segment 3-4 times as long as broad, with a less conspicuous tooth. Vein R₁ making an acute angle with R₅. Small, delicate species. 6-9 mm. (Enderlein's subfamily Chasmiinae) 3
- Labella nearly always larger, at least half total length of proboscis.* Anal cell definitely closed, apical portion of vein Cu₁ slightly convex. Median ocellus sometimes present, usually absent, and vertex not grooved. Antennae of varying structure. Vein R₁ often right-angled at its base, sometimes with an appendix. Species generally larger, more robust 4
3. First antennal segment twice as long as it is thick, cylindrical in side-view. Third antennal segment parallel-sided, tooth insignificant *Chasmia* End.
- First antennal segment not twice as long as thick, in side-view triangular, as in *Tabanus*. Third segment with a more or less distinct tooth *Chasmiella* End.
4. Thorax and abdomen partly metallic blue-green, with or without pale areas. Subcallus and central area of face bare and shining. Tibiae bicoloured, white basally, black apically, but not appreciably flattened *Chalybosoma* gen. nov.
- Body not metallic 5
5. First antennal segment slender, subcylindrical in side-view, longer than broad, often much longer (tribe Diachlorini) 6
- First antennal segment subtriangular in side-view, not much longer than broad 7
6. Subcallus swollen, shining [*Udenocera* Ric.]
- Subcallus not swollen, nor shining, though frons and callus may be shining [*Paracanthocera* End.]
7. Third antennal segment without a trace of a tooth. Ocelli present in a large, equilateral triangle *Ommia* End.
- Third antennal segment with the usual tooth 8
8. Subcallus swollen, shining 9
- Subcallus not swollen and shining† *Cydistomyia* Taylor
9. First antennal segment greatly inflated, shining *Neobolbodimyia* Ric.
- First antennal segment somewhat swollen, but not shining 10
10. A distinct ocellar callus present, but no ocelli. Face swollen, bare and shining. Second antennal segment with a dorsal lobe *Japenoides* gen. nov.
- No ocellar callus. Face tomented. Second antennal segment without a dorsal lobe [*Neotabanus* Ric.]

Key to the New Guinea Species of *Tabanus*.

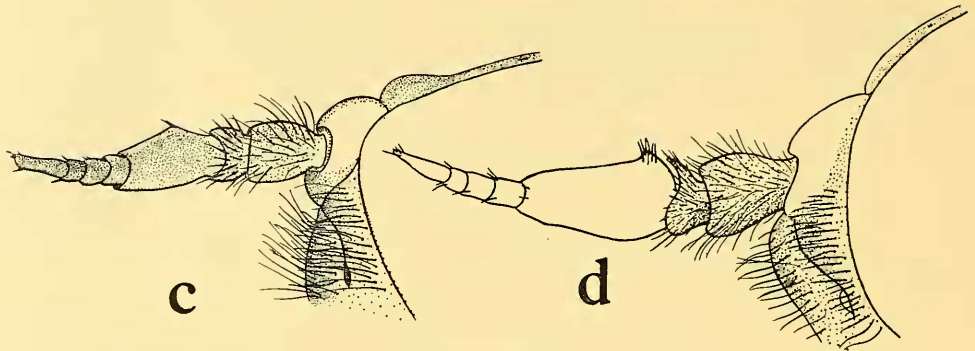
1. Subcallus swollen, bare and shining. Front tibiae broad, flattened, and conspicuously white on basal half *ceylonicus* Schin.
- Subcallus covered with tomentum, not markedly swollen 2
2. Third antennal segment with a forwardly-directed dorsal process (Text-figs. 5, 28). Frontal index 9-10, frons converging, callus almost linear. Large species, over 18 mm. 3
- Third antennal segment without such a well-developed process, though a distinct tooth may be present 4

* In dried specimens the labella sometimes become impaled on the tips of the stylets, and the stem of the labium is stretched, making it seem unusually long and attenuated.

† In *Cydistomyia imitans*, n. sp., the subcallus is bare, but is not developed as a prominent structure, and is not divided from the parafacials by a well-developed suture (see Text-fig. 2).

3. Large yellow and dark brown species, with banded abdomen. Wings brownish on apical half, yellowed towards base *aurivittatus* Ric.
 Large, dark mahogany species, abdomen shining, without pattern, and with uniformly black hairs, except for conspicuous orange tufts laterally on segments 5 and 6, and a few orange hairs at extreme apex. Wings deeply browned along veins *denticulatus* Ric.
4. Abdomen without median triangles or spots 5
 Abdomen with median triangles or spots. This includes species in which triangles of pale hairs can be seen, even if the tergite itself is uniformly coloured 17
5. Abdomen predominantly yellow or orange *cinnamoneus* Dol.
 Abdomen predominantly dark brown or black 6
6. Vein R_4 with appendix. Antennae, palpi and abdomen, dorsally and ventrally, and legs—black. Mesonotum strikingly contrasted in colour with abdomen. (Rubbed specimens of *productus*, n. sp. may run down to this point, but mesonotum is not strongly contrasted with abdomen, and third antennal segment is broad and strongly toothed) .. 7
 Vein R_4 without appendix; or antennae, palpi and abdomen not black; or mesonotum not strikingly contrasted with abdomen 9
7. Mesonotum thickly grey-dusted *stuberi*, n. sp.
 Mesonotum shining orange-red 8
8. Beard and fore-coxae brown-haired *illustris* Ric.
 Beard and fore-coxae white-haired *flammeus* S.S.
9. Mesonotum heavily tomented, grey or greenish, contrasting sharply with black abdomen .. 10
 Mesonotum not strongly contrasting with abdomen 11
10. Third antennal segment black. Mesonotum greenish, with short black hairs. First posterior cell distinctly narrowed towards wing margin *wollastoni* Ric.
 Third antennal segment orange. Mesonotum greyish with mixed pale and black hairs. First posterior cell not strongly narrowed towards wing margin *doreicus* Wlk.
11. Wings rusty-yellow, contrasting strongly with thorax, abdomen and legs, all of which are black with black hairs *flavipennis* Ric.
 Wings browned, but not rusty-yellow, not in marked contrast with a black body and legs 12
12. Larger species (18 mm. or more). Wings browned, with clearer areas in many cells, but not noticeably paler at wingtip. Third antennal segment obscurely reddish, not contrasting strongly with rest of antennae 13
 Smaller species (16 mm. or less). Wings may be browned at base, with tip distinctly paler, or may have colour just along veins. Third antennal segment orange, in contrast with first two segments, which are brownish 14
13. Pleura with dark brown hairs. Third antennal segment dull orange *pollinosus* Ric.
 Pleura reddish brown, with reddish brown hairs. Third antennal segment bright orange *angusticallosus* S.S.
14. R_4 with appendix. A blue-grey species with darkened wings. Frons very tapering (Text-fig. 34) *opalescens* S.S.
 R_4 without appendix. Not a blue-grey species, frons not so tapering 15
15. Black-brown species. Hairs of prothorax and squamal fringe black. Brown colour of wing-tip spread evenly along veins, no distinct clouds *furunculigenus* Dol.
 Hairs of prothorax and squamal fringe pale. Brown colour of wing stronger along veins, and forming distinct clouds on crossveins and on fork of R_4 16
16. Bluish black species, with a bluish sheen on some, at least, of the abdominal tergites. Palpi bluish with bluish sheen *recusans* Wlk.
 Brown species, with abdomen and venter yellowish. No bluish sheen. Palpi white, with black hairs *vanleeuweni*, n. sp.
17. A middle-sized (12-18 mm.) grey species, with three rows of pale triangles on abdomen, merging into three almost parallel-sided stripes. Callus sometimes broken into two *rufinotatus* Big.
 Without three distinct rows of pale triangles 18
18. Third antennal segment exceptionally broad and short (Text-figs. 35, 39) 19
 Third antennal segment not broad and short 21
19. R_4 with long appendix. A middle-sized species, black, with only a few white hairs in middle of each segment *productus*, n. sp.
 R_4 without appendix. Abdominal triangles distinct 20
20. Larger (15 mm.) species, dark brown, shining, with distinct small, pale median triangles. Callus rectangular, with a linear extension (Text-fig. 35). Palpi normal *lenticulatus*, n. sp.
 Smaller (12 mm.) species, with greyish thorax and reddish brown abdomen, on which triangles are distinct, yellowish. Palpi short, plump and pointed. Callus (Text-fig. 39) *truncatus*, n. sp.

21. Middle-sized (15 mm.), grey and black species, with one median row of very distinct, separated pale spots on the abdomen. Thorax with two distinct grey stripes. Frons relatively broad, index 6 or less (*semicircularis*-group) 22
 Either larger, or brown, or—if middle-sized and grey—then without a median row of very distinct, separated pale spots on abdomen. Frons relatively narrow, index $6\frac{1}{2}$ -10 .. 24
22. Third antennal segment and following segments relatively elongate (Text-fig. 12). Wings clear, without clouds or spots on crossveins, and with small appendix. Abdominal median spots triangular, diminishing in size from second segment backwards. Frontal callus as in Text-figure 12 *exagens* Wlk.
 Third antennal segment and following segments relatively shortened (Text-figs. 17, 44). Wings with distinct brown clouds, especially on radial fork and at apex of discal cell. Abdominal median spots rounded in outline 23
23. Frontal callus elongate (Text-fig. 17). Subcallus with uniformly yellowish tomentum. Shorter and broader species, in which the first abdominal spot is usually isolated and the rest bunched together. Generally with distinct appendix to R_4 .. *semicircularis* Ric.
 Frontal callus short, with fine linear extension (Text-fig. 44). Subcallus, around antennal sockets, dark velvety brown. More elongate species, in which the abdominal median spots are evenly spaced. Generally without appendix to R_4 *angustilineatus*, n. sp.
24. Relatively small species (12-14 mm.), in which the median spots, if present, tend to merge into a parallel-sided stripe. Fore-tibiae distinctly paler on basal half (*cohaerens*-group) 25
 Mostly relatively larger species (16 mm. upwards). Median spots not tending to merge into a median stripe. Fore tibiae only indistinctly paler at base, or uniformly coloured 27
25. Mesonotum without, or with only inconspicuously golden scaly hairs among the black hairs. First antennal segment relatively longer (Text-fig. 11) *divisus* Ric.
 Mesonotum with conspicuous recumbent golden scaly hairs among the black hairs. First antennal segment relatively shorter and broader (Text-figs. 10, 42) 26
26. Frons broader, more parallel-sided, index 8 (Text-fig. 10). Lighter-coloured species, with yellowish abdomen and grey thorax. Median abdominal stripe pale and distinct *cohaerens* Wlk.
 Frons more tapering, index 10, narrowest just above antennae (Text-fig. 42). Darker species, abdomen brown or reddish brown. Median abdominal stripe indistinct *approximatus*, n. sp.
27. Female with third antennal segment and fore-femora black 28
 Female with third antennal segment and fore femora either orange or obscurely darkened, not black 31
28. Frons almost parallel-sided, index $6\frac{1}{2}$, callus flask-shaped, with broad extension (Text-fig. 41). Vein R_4 without appendix *infuscatus*, n. sp.
 Frons tapering towards antennae. Vein R_4 with appendix 29
29. Abdomen shining dark brown, with clear-cut median triangles. Callus short, rectangular, with fine linear extension (Text-fig. 40) *patriarchus*, n. sp.
 Abdomen black, with a bluish sheen in certain lights, triangles of pale hair very indistinct 30
30. Frons strongly tapered, index $10\frac{1}{2}$ (Text-fig. 34). Abdomen rather narrow .. *opalescens* S.S.
 Frons not so strongly tapered, index $7\frac{1}{2}$ (Text-fig. 39). Abdomen broader, species of normally stout appearance *truncatus*, n. sp.
31. Parafacial hairs and beard brown. Frons relatively broad, more parallel-sided. Callus clearly divided into a broad basal part and a linear extension. Third antennal segment narrower (Text-figs. 13, 14) 32
 Parafacial hairs white or yellowish. Frons relatively narrow, or more tapering, or callus tapering smoothly, without a distinct neck. Third antennal segment broader (Text-figs. 15, 43) 33
32. Callus shorter, with long linear extension reaching nearly to vertex. Third antennal segment less slender (Text-fig. 14) *indistinctus* Big.
 Callus basally broad and large, with stout median extension reaching only half-way to vertex. Third antennal segment slender, tooth small (Text-fig. 13) .. *rubriventris* Macq.
33. A larger, more reddish species. Abdomen (fresh specimens) clear reddish brown, covered with fine black hairs, and with distinct triangles. When rubbed, almost uniformly brick-red. Wings strongly stained brown. Femora, especially hind femora, with predominantly black hairs. Third antennal segment twice as long as succeeding segments together (Text-fig. 15). Palpi normal *serus* Wlk.
 A smaller, more brownish species, abdomen dark brown, with distinct triangles. Wings very heavily stained brown. Femora, especially hind femora, with predominantly white hairs. Third antennal segment not more than $1\frac{1}{2}$ times as long as the succeeding segments together (Text-fig. 43). Palpi slender, scarcely swollen at base *daruensis*, n. sp.



Text-figure 2.

Antenna and subcallus of: *c*, *Neotabanus ceylonicus* Ric.; *d*, *Cydistomyia imitans*, n. sp.

Genus TABANUS.

TABANUS AURIVITTATUS.

Tabanus aurivittatus Ricardo, 1913, Nova Guinea, ix, zool. 3, p. 394; Stekhoven, 1926, Treubia, vi, suppl., p. 268.

A large, dark brown species, with yellow-banded abdomen and yellowed wings. The frons is long and narrow, with a long linear callus. Third antennal segment bears a prominent forward-projecting process (Text-fig. 5).

♀. *Head*. Frons long and narrow, proportions 18:12:125. Index 10½. Converging towards antennae. Callus almost linear, occupying three-quarters of length of frons (Text-fig. 5). Frons with yellow tomentum and brown hair. Subcallus not prominent, covered with uniform yellow tomentum, without hair. Face similar, facial swelling and parafacials with yellow or brown hairs, beard yellow. Antennae orange, first two segments darker, with mainly black hairs, third segment clear orange, with a strong projection (Text-fig. 5), following segments concolorous. Palpi orange, with mainly orange and a few black hairs. Proboscis yellow basally, black apically, labella about half total length.

Thorax. Mesonotum dark brown in ground colour, heavily covered with yellowish-brown tomentum, without stripes. Hairs mainly black on dorsum, lateral tufts golden except for a tuft of strong black hairs on prealar callus. Pleura with yellow tomentum and yellow hairs. Squamal fringe yellow.

Abdomen. Dorsum dark brown, with broad marginal yellow bands almost half width of segment, and expanded into median triangles which nearly reach the fore border. Hairs black on brown areas, yellow on yellow areas. Venter similar, without median triangles.

Legs. Coxae like pleura. Legs otherwise orange, hind tibiae and tarsi darker. Pubescence mainly golden, with a few black hairs. Hind tibiae with a very conspicuous fringe of golden hairs.

Wings. Membrane stained yellow, especially on fore border and along veins. Vein R₄ angled, but without appendix. Tegula with yellow tuft, subepaulet reddish brown with black hairs like those on costal vein.

Length of body: 24 mm.; *of wing*, 21 mm.

♂. Very closely similar. Eyes with large upper and small lower facets, sharply divided.

Holotype, from Regeu Is. (Lorentz), is in *Natura Artis Magistra*, Amsterdam.

In the British Museum is a paratype from Bivak Island (Lorentz), and there are two females from German New Guinea, Sattelberg, Huon Gulf (Biro). Ricardo and Stekhoven record other specimens from the same localities. The Archbold Expedition took one female at Bernhard Camp, 50 m., 15.x.1933 (J. Olthof), and one male at

Araucaria Camp, 800 m., 20.iii.39 (Toxopeus). In the material on loan from Sydney are two females from Wareo, Finsch Haven (Rev. L. Wagner), and one female from N. New Guinea, Motorbivak (v. Leeuwen).

TABANUS DENTICULATUS.

Tabanus denticulatus Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 397; Stekhoven, 1926, *Treubia*, vi, suppl., p. 490.

A large, shining, dark reddish brown species, distinguished by the long tooth to the third antennal segment, and by the conspicuous orange lateral tufts on the fifth and sixth abdominal segments.

♀. *Head*. Frons long and narrow, proportions 18:14:97, index 7, converging slightly towards antennae. Callus linear, slightly expanded at lower end (Text-fig. 28), shining mahogany-brown. Frons with greyish tomentum and black hairs. Subcallus reddish in ground-colour, with thick yellowish tomentum and no hairs. Tomentum of face and parafacials more greyish, hairs black. Beard black. Antennae orange, first two segments darker, with black hairs, third segment bright orange with a very prominent dorsal projection (Text-fig. 28), following segments concolorous. Palpi orange with black hairs.

Thorax. Mesonotum and pleura dark red-brown, rather shining, with sparse greyish tomentum and black hairs. Pre-alar and post-alar tufts and squamal fringe yellow.

Abdomen. Like mesonotum, but more shining. Hairs black, with a black lateral tuft on each segment except the fifth and sixth, which have conspicuous orange lateral tufts. Venter similar.

Legs. Reddish brown with black hairs, coxae similar.

Wings. Membrane yellow, more heavily so basally, up to forks of R and M, clearer areas in base of cell R_1 and centre of cell R_{2+3} .

Length of body, 19 mm.; *of wing*, 19 mm.

♂. Similar.

Holotype, from Hellwig Mts., is in *Natura Artis Magistra*, Leyden.

Described from Hellwig and Wichman Mts., and recorded by Stekhoven from Lorentz's collecting area, Doorman Path, and from S. New Guinea. In the British Museum are three paratypes, and also the following specimens: Papua, Mt. Tafa, 8,500 ft., iii.1934 (Miss Cheesman), two females; Kaindu, Edie Creek, 6,550–7,000 ft. (F. H. Taylor), one female; Weyland Range, 6,000 ft. (O. S. Wickwar), one female.

The Archbold Expedition took a series of specimens at the following localities: Moss Forest Camp, 8,000 ft., x.1938 (Toxopeus), 60 females, one male; Iebele Camp, 6,750 ft., x.1938 (Toxopeus), three females, one male; Lake Habbema, 9,000 ft., viii.1938 (Toxopeus), two females.

In the Sydney Museum Collection from Kaindu, Edie Creek, 6,550–7,000 ft. (F. H. Taylor), three females; Komba (Rev. L. Wagner), one female; Papua, Waria R., 21.2.36 (H. O. C. Littlejohn), one female.

In the Harvard material from Morobe Dt., Mt. Misim (Stevens), one female.

TABANUS POLLINOSUS.

Tabanus pollinosus Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 395; Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 494.

Concisely described by Miss Ricardo as "A large, black species, the abdomen with a greyish plum-like bloom, thorax brownish. Antennae red, legs black. Wings brown". This description separates *pollinosus* from any other New Guinea species of *Tabanus*, except from *T. angusticallosus* S.S., which was erected for a specimen named as *pollinosus* by Miss Ricardo (see below).

♀. *Head*. Frons very long and narrow, proportions 10:10:92, index 9.2; narrowest in middle (seven units). Callus almost linear. Tomentum of frons, subcallus and face brown, parafacial hairs and beard dark brown. Antennae orange, first two segments darker, with black hairs; third segment brighter, with prominent tooth, but not a long process (Text-fig. 9), following segments slightly darker. Palpi brownish, with black hairs.

Thorax. Mesonotum and pleura brick-red when rubbed, normally obscured by brown and grey tomentum. Fine hairs on dorsum black, with a few reddish brown silky hairs among them. Supra-alar and postalar tufts, and squamal fringe, pale reddish brown.

Abdomen. Large and square, dark purple, covered with a plum-like bloom; this bloom is thicker on first two segments and thins behind, leaving the dorsum dully shining. Hairs all black, without paler median triangles. Venter similar, duller.

Legs. Femora and tarsi black, tibiae very obscurely dark mahogany-red. Hairs black.

Wings. Heavily browned, paler in centres of cells. Tegula with creamy hair-tuft.

Length. Body 18–22 mm.; wing 20 mm.

Described from Simbang, near Finsch Harbour. Type in Dr. Kertesz's collection, and one paratype in the British Museum.

In the British Museum are also six females from Waria R., "series collected both on Papua and New Guinea sides of river", 1935 (Littlechild). In the Sydney School of Public Health and Tropical Medicine are six females from the same locality; one female, Papua, Vailata R., Oct., 1923 (Murray); N.E. Papua, Mt. Lamington, 1,300–1,500 ft. (McNamara). In Mr. Lee's material from New Guinea, Lae, 1947 (Bayley). In the U.S. National Museum Collection from Nadzab, Markham R. valley, Sept., 1944 (Krombein).

TABANUS ANGUSTICALLOSUS.

Tabanus angusticallosus Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 495.

This is very closely similar to *pollinosus* Ric. and may possibly be a form of it. I do not follow all the differences listed by Stekhoven, whose unique type specimen had previously been labelled as *pollinosus* by Miss Ricardo. Yet it seems that two species can be recognized here, a darker and a more reddish brown one, distinguished most easily by the colour of the pleural hairs. These are dark brown in *pollinosus*, red-brown in *angusticallosus*.

Type in the British Museum, from Milne Bay. Also in the British Museum are eight females, Papua, Kokoda, 1,200 ft., ix–x.1933 (Miss Cheesman). In the Harvard collection, one female, Milne Bay, July (R. S. Wind). In Mr. Lee's material, one female, Milne Bay, Feb., 1943 (Mackerras).

A distribution-map of these two forms (Text-fig. 3M) indicates that they are localized in the S.E. of the island as two species or subspecies, *pollinosus* to the north and *angusticallosus* to the south, meeting in the Kokoda-Buna area. Neither species was taken by the Archbold Expedition in the central mountains.

TABANUS WOLLASTONI.

Tabanus wollastoni Ricardo, 1913, *Nova Guinea*, ix, zool., 3, p. 395 (*lapsus*).

Tabanus wollastoni Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 493.

A large species, easily recognized by the greenish yellow, black-haired thorax, contrasting strongly with the velvety black abdomen. Wings heavily browned, especially along veins. Legs black.

♀. *Head.* Frons proportions 12:12:108, index 9, constricted to eight units intermediately. Callus almost linear (Text-fig. 8). Tomentum of frons, subcallus, face, parafacials and buccae all golden yellow. Hairs of frons, face and parafacials sparse, dark brown. Beard yellow, but with some brown hairs on buccae. First two antennal segments dark reddish with black hairs, rest black. Palpi dark brown with black hairs.

Thorax. Mesonotum thickly covered with greenish yellow tomentum, pleura similar, browner ventrally. Hairs black, except propleural supra-alar, postalar, hypopleural tufts and hairs at sides of scutellum, which are golden yellow.

Abdomen. Velvety dark brown or black, with uniform, recumbent black hairs.

Legs. Entirely black or very dark red-brown, with entirely black hairs.

Wings. Heavily stained with dark brown, especially along veins, with some clearer areas in cells. Not noticeably paler at tip. Tegula with golden tuft.

Length. Body 20 mm.; wing 18 mm.

Type in the British Museum. There also are two female paratypes, Dutch New Guinea, Mimica R., Aug., 1910 (Wollaston); two females, Bivak-Elland (Lorentz Exped.); one female, "New Guinea", with no collector's name. One female in the British Museum from the Aru Islands, 1911 (Froggatt), has the third and later antennal segments bright orange, and has more yellow hairs on the pleura. This probably represents an island form.

Schuermans Stekhoven adds other records of the Lorentz Expedition, Etna Bay, Alkmaar, Kloofbivak, Regen Is.

TABANUS DOREICUS.

Tabanus doreicus Walker, 1861, *Proc. Linn. Soc. Lond.*, 5, p. 233; Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 396; Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 496.

Atylotus sonnerati Bigot, 1892, *Mem. Soc. zool. France*, 5, p. 672.

Ricardo remarks that all the known specimens of this species are faded and that in fresh specimens the tomentum of the thorax would probably be brighter and the contrast between it and the dark abdomen would be more pronounced. From *wollastoni* it is readily separated by the more orange antennae, the pale hairs of the mesonotum, and the unnarrowed first posterior cell.

♀. *Head.* Frons proportions 12:10:87, index 9, narrowest point seven units. Callus prominent, elongate, with spindle-shaped extension (Text-fig. 6). Tomentum of frons, subcallus, face and parafacials yellow. Dark hairs, brown hairs on buccae, face, parafacials and frons, though beard is mostly yellow. Palpi brown, with black hairs. Antennae (Text-fig. 6): first two segments orange with black hairs. The rest is missing in Walker's type; in Bigot's type third segment bright orange, others darker.

Thorax. Mesonotum and pleura thickly covered with greyish yellow tomentum. Mesonotum with short black hairs, freely mingled with pale yellow hairs, side margins with yellow tufts. Pleural hairs chiefly black, some yellow, on pteropleuron and in tufts around wing base.

Abdomen. Dorsally dark red-brown with black hairs, ventrally similar, but more dark brown.

Legs. Blackish brown, with black hairs.

Wings. In Bigot's type, uniformly brown. In Walker's type, darker along anterior veins and paler at tip. Ricardo mentions the variation in this respect.

Length. Walker's type: Body 17 mm., wing 16 mm.; Bigot's type: Body 14 mm., wing 13 mm.

I have seen three specimens of this species, all in the British Museum. Walker's type is from Doré (A. R. Wallace), and Bigot's type simply from "New Guinea". The third specimen is from Frühstorfer's collection and was recorded by Ricardo and Schuurmans Stekhoven as from "Keepaun", Dutch New Guinea. The MS label, however, is clearly either "Keipaur" or "Kapaur". I cannot find either of these in any gazetteer, but my lepidopterist colleagues in the British Museum, who have charge of much material collected by Frühstorfer, tell me that Kapoer or Kapaur is an earlier name for Fak-Fak in the Onin Peninsula (2° 55' S., 132° 17' E.).

Walker's and Frühstorfer's specimens are clearly similar. Bigot's is smaller and more uniformly brown in the wings. Ricardo also records one specimen in Kertesz's collections from Finsch Harbour at the other end of New Guinea.

TABANUS FLAVIPENNIS.

Tabanus flavipennis Ricardo, 1913, *Bijdr. Dierk.*, 19, p. 71; Schuurmans Stekhoven, 1924, *Treubia*, v, p. 293, and Boeroe-Publ., II, p. 1; 1926, *Treubia*, vi, suppl., p. 500.

A very distinct species, easily recognized by the dull black head, antennae, body and legs, and the rusty-yellow wings. Frons very narrow, index 9, narrowest point eight units, tapering very slightly toward antennae. Callus very long, almost linear (Text-fig. 29). Length of body 18 mm., of wings 18 mm.

This species has not yet been recorded from New Guinea, and seems to be confined to the island of Buru. There are three females, including the type, in the British Museum collection, and Stekhoven lists detailed localities within the island. He summarizes them thus: ". . . *Tabanus flavipennis* is a Tabanid belonging to the hill and mountainous region; it is found between 100 and 1,300 m. above sea-level, and prefers moist places."

TABANUS CINNAMONEUS.

Tabanus cinnamoneus Doleschall, 1858, *Natur. Tijds. Ned.-Ind.*, xvii, p. 84; Szitády, 1926, *Biol. Hung.*, 1, p. 13.

Tabanus ceramensis Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 377. *New Synonymy.*

A very distinctive species, in which the thorax is thickly yellow-tomented, abdomen dorsally bright orange with orange hairs, and ventrally shining black-brown with black hairs, legs black, wings dark brown. It was described from a unique male, and the females show some slight deviation.

♀. *Head.* Frons proportions 12:10:84, index $8\frac{1}{2}$, narrowest point nine units. Callus almost linear, shining reddish brown (Text-fig. 30). Tomentum of frons, subcallus, face, parafacials and buccae bright yellow; hairs black at vertex, otherwise bright yellow, including beard. Antennae: first two segments orange with black hairs, third segment bright orange with a strong tooth bearing a short tuft of black bristles, following segments black. Palpi lemon-yellow, but thickly covered with short black hairs.

Thorax. Mesonotum thickly covered with lemon-yellow tomentum and sparse erect black hairs intermingled with recumbent yellow ones. Pleura similar, more brown ventrally, hairs yellow.

Abdomen. Dorsally bright orange, extreme margins yellowish, orange hairs predominating, including lateral fringe, but black hairs visible beneath them. No pattern. Ventrally shining black-brown with black hairs, extreme margins reddish, with a short marginal fringe of orange hairs.

Legs. Front coxae yellow with yellow hairs basally, apically brown with black hairs. Other coxae brown with mostly black hairs. Legs black or very dark red-brown, with black hairs.

Wings. Very dark brown, paler at tip. First posterior cell slightly or strongly narrowed towards margin. Tegula with orange tuft.

Length. Body 19 mm.; wing 15 mm.

♂. See below.

The above description and the figure (Text-fig. 30) are taken from mainland specimens. The male from Hollandia is closely similar to these females, but Doleschall's and Stekhoven's types, both males, show some differences. They are smaller, have a more slender antenna, with a less pronounced tooth, and have the first posterior cell less strongly narrowed.

I am sure that *cinnamoneus* and *ceramensis* are the same species, but the mainland specimens may be a distinct species. I have not described them as new for the following reasons: the characters concerned are variable, and a male from Aru Is. is intermediate, having a more slender antenna, but a somewhat narrowed first posterior cell; the two male types are island specimens and would be expected to differ from the mainland form; I have no female to match with them.

Doleschall's type male, from Amboina, April, is labelled "1859". although the description was published in 1858. Perhaps this was an error for 1856. The type is in the Naturhistorisches Museum, Vienna, and was kindly lent to me by Dr. Max Beier. Stekhoven's type, a male also, is in the British Museum, and is from Ceram (Wallace). In the British Museum also are one female, Cyclops Mts., Sabron, 900 ft., v.1936 (Cheesman) and 1 female, Humboldt Bay Dt., Bewani Mts., ix.1937 (Stüber). In the Archbold Collection one female, Hollandia, vii.1938 (Toxopeus). In the School of Public Health and Tropical Medicine, Sydney, are one female, Mamberamo, Alb.-Bivak,

vii.1926 (v. Leeuwen), and the male from Aru Is., Elgner, 1911 (Froggatt), referred to above. In the Washington Collection are one male and two females from Hollandia, April, 1945 (Malkin).

TABANUS FURUNCULIGENUS.

Tabanus furunculigenus Doleschall, 1858, *Natur. Tijd. Ned.-Ind.*, xvii, p. 84; Szitády, 1926, *Biol. Hung.*, 1 (?), p. 13.

Tabanus obscuratus Walker, 1864, *Proc. Linn. Soc. Lond.*, viii, p. 232; Ricardo, 1912, *Bijd. Dierk.*, 19, p. 71; 1913, *Nova Guinea*, ix, zool. 3, p. 389, *note*; Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 468; 1932, *Arch. Naturg.*, 1 (1), p. 89.

A middle-sized (16 mm.) dark brown species, without any distinctive characters, separated from *pollinosus* Ric. mainly by its smaller size, and from *recusans* Walker by the absence of any bluish sheen at the base of the abdomen. The following description is taken from Walker's type specimen.

♀. *Head.* Frons proportions 12:10:83, index $8\frac{1}{4}$, narrowest point nine units. Callus almost linear (Text-fig. 7). Tomentum of frons, subcallus and face yellow-brown, hairs, including beard, dark brown. Antennae (Text-fig. 7) first two segments brown with black hairs, rest bright orange. Palpi brown with black hairs.

Thorax. Mesonotum brown, with brown, black and a few yellowish hairs (denuded in type). Pleura similar, entirely with black or dark brown hairs.

Abdomen. Dark brown with black hairs. No median triangles visible. Venter similar.

Legs. Dark brown with entirely black or dark brown hairs.

Wings. Brown colour distributed along veins. Tegula with black hairs.

Length. Body 16 mm.; wing 16 mm.

♂. Similar, wings more clearly pale at tips.

Stekhoven (1926) points out that the wings of the type are much lighter in colour than those of any other Ceram females, but that this may be due to fading of the type.

Doleschall's type, from Amboina, is in the Naturhistorisches Museum, Vienna, and was kindly lent to me for study by Dr. Max Beier.

In the British Museum are the holotype* of *obscuratus* female from Ceram (A. R. Wallace); four females from Ceram (various collectors) and one from Amboina 2-5.xi.1923 (C. J. Brooks); in addition there are four females from Ternate from Bigot's collection, where they stood as *furunculigenus* Dol.

In the School of Public Health and Tropical Medicine, Sydney, are four females, N. New Guinea, Pionierbivak, June-July, 1920 (v. Heurn); one male, N. New Guinea Exp., 1926, Motorbivak (v. Leeuwen); one female, Mamberamo, Albatros Bivak v, 1926 (v. Leeuwen). In the Archbold collection is one female from Araucaria Camp, 2,500 ft., 2.iv.1939 (Toxopeus).

Stekhoven records this species from Ceram and from the van Heurn collecting area at Pionierbivak and Prauwenbivak. He does not comment on the fact that the mainland New Guinea specimens have much more yellow hair on the mesonotum than the Ceram specimens. It is possible that two species are represented, but more likely that the two are merely geographical races.

TABANUS RECUSANS.

Tabanus recusans Walker, 1859, *Proc. Linn. Soc. Lond.*, 3, p. 83; Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 397; Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 507.

A medium-sized species, blackish, distinguished from *obscuratus* Walker by the plum-like bloom on the thorax and first two abdominal segments. A slight difference

* In a letter dated Nov., 1940, the late Mr. F. H. Taylor told me that he had located some of Francis Walker's types in the National Museum, Melbourne, among them being *T. obscuratus*, *T. exagens*, and *T. serus*. The specimens in the British Museum which I have quoted as types in this paper are part of the original material brought home by Wallace, and, since Walker did not commonly indicate holotypes, there seems to be no obvious way of deciding between the two sets of specimens. It would be better to regard them as co-types, unless any reason should arise for suspecting that they are not conspecific.

in venation can be seen in *recusans*; vein R_4 is flattened in its middle course, so that the tip of the first submarginal cell (cell R_{2+3}) is narrowest some distance from the end, instead of narrowing steadily towards the tip (Text-fig. 3). First posterior cell (cell R_5) not so much narrowed as in *obscuratus*.

♀. *Head*. Frons proportions 12:9:80, index 9. Callus as in Text-fig. 31. Frons with yellow tomentum and fine black hairs. Face with yellow-brown tomentum, hairs golden brown, beard darker brown. Antennae (Text-fig. 31): first two segments brownish orange with black hairs, third segment bright orange, following segments slightly darker. Palpi blackish brown with a purplish bloom and black hairs; stout at base, tapering to a long point.

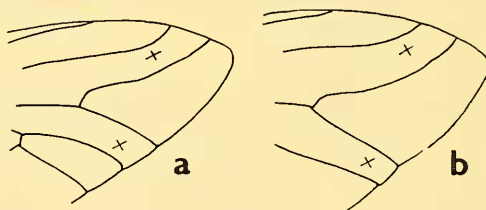
Thorax. Mesonotum grey-brown, with an overlying purple bloom; scutellum mahogany-red, humeri and notopleural calli orange. Upright fine black hairs and recumbent greenish yellow ones, lateral tufts largely pale. Pleura greyish with purplish bloom, hairs chiefly brown, but pale on propleuron.

Abdomen. Dorsum dark brown, first two segments with a purplish bloom; venter exactly similar. Hairs black, except centrally on first tergite, where they are pale.

Legs. Dark reddish, femora and tarsi darker than bases of tibiae, femora with some purplish bloom. Hairs dark brown or black.

Wings. Browned, paler at tip, with more or less distinct clouds on some of the cross-veins, especially on radial fork. Vein R_4 flattened (Text-fig. 3). Tegula with mixed pale and black hairs.

Length. Body 16 mm.; wing 14 mm.



Text-figure 3.

Tip of wing in: a, *Tabanus recusans* Wlk.; b, *T. obscuratus* Wlk., showing shape of cells R_{2+3} and R_5 .

In the British Museum are the holotype female from Aru Is. (A. R. Wallace) and one female from Waigeu, Camp Nok, 2,500 ft., iv.1938 (Cheesman).

In the School of Public Health and Tropical Medicine, Sydney, are four females from Angoram (S. H. Christian) and one female from Wewak (Curtis Deland).

Stekhoven records this species from Noordrivier (Lorentz), Salawatti Is., and Haroeka (? Haruku Is., Amboina group).

TABANUS VANLEEUWENI, n. sp.

A species differing from *obscuratus* and *recusans* in the browner coloration of abdomen and legs. The prothoracic hairs are white and the wings more strongly browned on the foreborder and at the base of the radial fork.

♀. *Head*. Frons proportions 11:9:67, index $7\frac{1}{2}$. Callus elongate (Text-fig. 37). A small bare spot near vertex. Tomentum of frons bronze-yellow, with black hairs. Subcallus tomented, pale brown, contrasting with face, parafacials and buccae, which are white. A few brown parafacial hairs anteriorly, rest of hairs snow-white. Antennae (Text-fig. 37): first two segments brown with black hairs, third segment bright orange, following segments black or blackish. Palpi white, with black hairs.

Thorax. Mesonotum blackish brown, with fine black hairs and sparse, pale yellow, scaly hairs. Humeri and notopleural calli orange. Pleura blackish, with white tomentum and mainly white hairs, a few black ones on mesopleuron.

Abdomen. Reddish brown, blackish towards tip. Hairs of dorsum black, those of venter whitish.

Legs. Reddish brown, femora and tarsi, especially those of forelegs, somewhat blackish. Hairs mainly black.

Wings. Somewhat browned all over, but more strongly so on foreborder, with a more or less distinct small cloud on base of R₁. Vein R₁ slightly flattened, not so strongly as in *recusans*.

Length. Body 14 mm.; wing 12 mm.

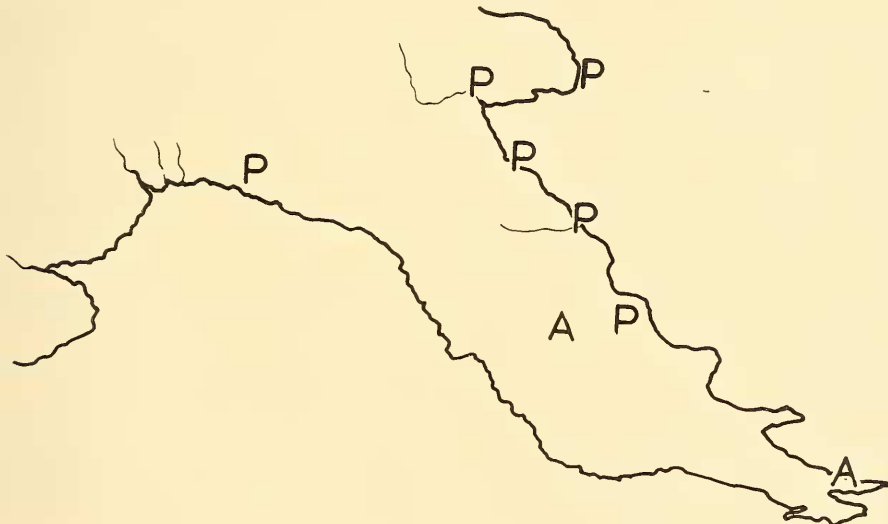
In the School of Public Health and Tropical Medicine, Sydney, are two co-types, females from N. New Guinea, Mamberamo, Albatros Bivak, v and vii, 1926 (v. Leeuwen). In the Archbold collection one female paratype from Bernhard Camp, 150 ft., 19.ix.1938 (Olthof).

I have created these two co-types instead of one holotype because one specimen has lost the antennae and the other is greasy and discoloured, especially about the pleura.

TABANUS OPALESCENS.

Tabanus opalescens Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 513.

A distinctive species, almost uniformly blue-grey in colour, wings browned, frons strongly narrowed towards antennae (Text-fig. 34), thorax and abdomen rather elongate. It seems to belong near *obscuratus* Walk., but because the Japen specimen has very indistinct triangles of pale hairs on the abdomen I have included the species twice in the key.



Text-figure 3M.

Map showing distribution of *T. pollinosus* Ric. and *T. angusticallosus* Ric.

♀. *Head.* Frons proportions 13:7:73, index 10½. Frons with slate-grey tomentum and black hairs, callus long and narrow, with a small lower expansion (Text-fig. 34). Subcallus with brown tomentum, contrasting with parafacials, face and buccae, which are grey with mainly black hairs; lower and inner part of beard white. Antennae (Text-fig. 34): first two segments brown, other black or blackish. Palpi blackish with black hairs.

Thorax. Mesonotum dark brown, but thickly overlaid with a blue-grey tomentum. Hairs fine black and recumbent yellowish, about equally mixed. Pleura similar in colour, hairs chiefly white, some dark hairs on mesopleuron.

Abdomen. Thickly covered with blue-grey tomentum. Hairs black on dorsum, white or whitish on sides, venter, and partly on dorsum of first segment. Near each side of this segment is a patch of thick black hairs which stands out among the white. The Japen specimen has very indistinct triangles of pale hairs on abdomen.

Legs. Coxae mainly with silvery hairs, fore coxae with a few black hairs apically. Femora black, with a bluish sheen like the thorax. Tibiae reddish brown basally, darker apically, tarsi also dark. Some white hairs ventrally on femora, other hairs black.

Wings. Almost uniformly browned, slightly darker anteriorly. Vein R_4 with moderately long appendix. Tegula with mainly pale tuft.

Length. Body 15 mm.; wing 12 mm.

Described from Heuvel Bivak (Lorentz), paratypes from Kloof Bivak, 31.10.1913 (Versteef). Type in *Natura Artis Magistra*, Amsterdam.

In the British Museum are three females, Humboldt Bay Dt., Bewani Mts., ix.1937 (W. Stüber); one female, "Hollandia", 140° E., 3° 10' S., 1,000–2,000 ft. (W. Stüber); one female, Japen Is., Mt. Eiori, 2,500 ft., x.1938 (Cheesman).

In the Archbold collection, one female, Hollandia, vii.1938.

TABANUS ILLUSTRIS.

Tabanus illustris Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 398; Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 504.

A distinctive species with purplish black abdomen and contrasting bright red thorax. It can only be confused with the following species, *T. flammeus* S.S.

♀. *Head.* Frons proportions 15:13:85, index $6\frac{1}{2}$. Callus flask-shaped, median extension very long and rather thick (Text-fig. 16). Tomentum of frons silvery in certain lights. Tomentum of subcallus golden-brown; face, parafacials and buccae ashy, with brown hairs. Antennae (Text-fig. 16): black, first segment more greyish. Palpi blue-grey with black hairs, broad at base and tapering to a slender point (cf. *T. flammeus*).

Thorax. Mesonotum bright orange-red. Fine hairs black, a few short golden hairs, especially on the postalar calli and before the scutellum. Pelura red, thickly overlaid with a purplish tomentum; hairs mostly black, some pale on pronotum and on ptero- and metapleuron.

Abdomen. Dorsum and venter black, with a plum-like bloom. Hairs black, no pale median triangles.

Legs. Black, femora purplish, tibiae rather reddish. Hairs, including hairs of coxae, black.

Wings. Yellowish-tinted, rather darker on foreborder. R_4 with short appendix.

Length. Body 17 mm.; wing 15 mm.

In the British Museum is the holotype female from Iwaka R. (Wollaston). Stekhoven records one female from the Lorentz collection.

TABANUS FLAMMEUS.

Tabanus flammeus S.S., 1926, *Treubia*, vi, suppl., p. 505.

This species was created for four females from Heuvel Bivak (Lorentz), three of which were recorded by Ricardo as a form of her species *illustris*. I think Stekhoven is correct in regarding the differences as of specific value, and from the few specimens available it looks as if *flammeus* is the more widely distributed of the two. It differs from *illustris* in the shape of the callus and the darker tomentum of the frons; the shorter and stouter palpi; the white pubescence of beard and coxae; and the darker wings, with a longer appendix to R_4 .

♀. *Head.* Frons proportions 16:13:73, index $5\frac{1}{2}$. Callus flask-shaped, with stout median extension only half the length of the frons (Text-fig. 32). Tomentum of frons silvery-white beside lower callus, becoming blackish above, and purplish at vertex, upper part of frons with rather long black hairs. Hairs of face and parafacials dark brown, beard snow-white. Palpi shorter and plumper than in *illustris*.

Thorax. Mesonotum with yellowish hairs more abundant than in *illustris*, and pleura with predominantly white hairs.

Abdomen as in *illustris*.

Legs. As in *illustris*, but coxae and femora with long white hairs; femora with black hairs as well.

Wings. Markedly darkened in front, up to and including vein R_5 . Appendix of R_4 longer than in *illustris*.

Length. Body 14 mm.; wing 12 mm.

The holotype female from Heuvelbivak (Lorentz) is in *Natura Artis Magistra*, Amsterdam, and one paratype female from this locality is in the British Museum.

In the Harvard Museum, one female, Morobe district, Mt. Misim, 7,000 ft. (Stevens). In the Archbold collection is one female from Sigi Camp, 4,500 ft., 29.ii.1939 (Toxopeus). This is a subsidiary camp in the vicinity of Bernhard Camp (see Archbold *et al.*, 1939, p. 226).

TABANUS STÜBERI, n. sp.

A medium-sized, mainly black species, in which the mesonotum is grey and contrasts strongly with the black abdomen. It is less brown in appearance than *doreicus* Wlk., and has no appendix to R_4 .

♀. *Head.* Frons proportions 13:10:78, index 8. Callus as in Text-fig. 33. Tomentum of frons greyish brown, with black hairs, which are rather longer towards the vertex. Face, parafacials and buccae brown-and-grey tomented, hairs mostly brown, but beard white posteriorly. Antennae dull reddish on first two segments, rest black. Palpi blackish, with thin golden tomentum and black hairs.

Thorax. Mesonotum black-brown, with a grey tomentum which gives the whole an ashy appearance. Fine black hairs mingled with a yellowish-white pubescence, which is thicker on hind half. Notopleural tuft mainly black. Pleura more brownish than notum, with mainly brown hairs.

Abdomen. Dark black-brown, uniformly covered with black hairs, without pale median triangles.

Legs. Blackish brown, femora with a greenish sheen. Hairs black.

Wings. Browned, colour slightly stronger along veins, and paler in centre of cells, especially towards wing tip. Vein R_4 with short appendix.

Length. Body 15 mm.; wing 14 mm.

Holotype female, Humboldt Bay dist., Bewani Mts., ix.1937 (W. Stüber), in the British Museum.

Paratypes: In the Archbold collection two females, Bernhard Camp, 9.ix and 11.x.1938 (Olthof); in the U.S. National Museum, four females, five males, Hollandia, April, 1945 (Malkin).

All the specimens from Hollandia are immature, probably part of a newly emerged batch. For this reason I cannot say whether the male coloration differs from that of the female, but the two appear to be the same.

TABANUS SEMICIRCULARIS.

Tabanus semicircularis Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 392.

Tabanus semicirculus Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 335.

A middle-sized (15 mm.) species, brown and white, thorax with two narrow grey stripes, abdomen with white crescents at base of second segment, and four segment with a semicircular median white spot and white lateral margins.

♀. *Head.* Frons proportions 13:12:64, index $5\frac{1}{2}$, almost parallel-sided. Callus light brown, club-shaped, with linear extension extending almost half length of frons (Text-fig. 17). Tomentum of frons white, with some black and some silvery hairs. Subcallus and upper parafacials with golden tomentum, latter with some brown hairs; rest of face and buccae white, with silvery hairs. Antennae (Text-fig. 17) mainly black, somewhat reddish basally. Palpi shining white, with black hairs.

Thorax. Mesonotum red-brown with paler tomentum at sides and on two narrow longitudinal stripes. Hairs are chiefly black on darker areas and chiefly yellowish white on pale areas; notopleural tuft mainly blackish, supra-alar and postalar tufts and scutellar fringe yellowish-white. Pleura white with white hairs.

Abdomen. Dark brown with black hairs, more yellow on first segment. Extreme base of second segment has a pair of crescent-shaped transverse white bands, and the second to fifth segments inclusive have a roughly semicircular white median spot; lateral margins of first five segments white. Venter largely brownish, with brown hairs, but basally and laterally white with white hairs.

Legs. Coxae with silvery hairs. Femora brick-red, tips of tibiae and all tarsi blackish. Hairs of femora and undersides of tibiae largely white, the rest black.

Wings. Somewhat browned in front, with a brown spot at base of R_4 and at tip of discal cell. R_4 with moderately long appendix.

Length. Body 13 mm.; wing 12 mm.

In the British Museum are the female holotype and one female paratype, both from Madew, St. Joseph River, 2,000–3,000 ft. (Stalker). These were apparently the only specimens previously known. In addition there are now in the British Museum 21 females, Papua, Mafulu, 4,000 ft., xii.1933; one female, Papua, Mondo, 5,000 ft., ii.1934; one male, Cyclops Mts., Sabron, Camp 2, 2,000 ft., vii.1936 (all collected by Miss Cheesman); three males, two females, Humboldt Bay Dt., Bewani Mts., ix.1937; three males, "Hollandia", 140° E., 3° 10' S., Jan., 1937–8 (Stüber).

This seems to be a species of the mountains. The above records represent two "pockets", one in Papua and the other south of Hollandia. No doubt further collecting will unearth similar areas elsewhere.

TABANUS EXAGENS.

Tabanus exagens Walker, 1864, *Proc. Linn. Soc. Lond.*, vii, p. 205; Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 390; Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 337.

Distinguished from *semicircularis* Ric. by having the median abdominal spots triangular, with slightly concave sides, by the proportions of the antennal segments (Text-figs. 12, 17), and by the unclouded wings.

♀. *Head.* Frons proportions 13:10:70, index 7. Callus flask-shaped with a linear extension about half length of frons. Subcallus and most of facial area white (subcallus brown in some lights), with a transverse brown band running through bases of antennae. Hairs brown on this band, white elsewhere, including beard. Antennae (Text-fig. 12) black, bases of segments a little reddish. Palpi whitish, with black hairs.

Thorax. Brown, with cinereus tomentum. Grey stripes broad, leaving only a narrow band between them. Sparsely covered with fine, erect black hairs and recumbent whitish ones; a triangle of longer black hairs before scutellum, the whitish hairs otherwise longer posteriorly. Pleura with white tomentum and mainly white hairs.

Abdomen. Dark brown with black hairs, on which a pattern is formed of grey tomentum and whitish hairs. This pattern consists of a patch in middle of first segment, a large triangle on second, smaller ones on third and fourth, and a faint one on fifth. Segmentations and side margins are also narrowly white. Venter obscurely reddish and blackish, with black hairs and paler segmentations.

Legs. Blackish, a little brownish at the knees, femora with a bluish sheen. Coxae white-haired above, black-haired below, femora with some white hairs, otherwise legs mainly black-haired.

Wings. Clear, R_4 with short appendix.

Length. Body 14 mm.; wing 12 mm.

In the British Museum are the holotype female and one female paratype from Mysol (Wallace); three females from Lorentz's collection; one female, "New Guinea" (ex Bigot's colln.); two females, "Hollandia" (140° E., 3° 10' S.), 900–1,500 ft. (Stüber); two females, Humboldt Bay Dt., Bewani Mts., 1,200 ft., vii.1937 (Stüber).

In the Archbold collection are three females, Bernhard Camp (Olthof), one dated viii.1938, and the other 15.x.1938.

TABANUS ANGUSTILINEATUS, n. sp.

A species that, in general appearance, combines the characters of *semicircularis* Ric. and *exagens* Walk. It has an abdominal pattern like that of *exagens*, but the spotted wings of *semicircularis*. The shape of callus and antennae, however, show it to be a distinct species.

♀. *Head*. Frons proportions 10:10:63, index 6, parallel. Callus short, flask-shaped, with only a very short, fine linear extension (Text-fig. 44). Tomentum of frons, subcallus and entire facial area white, except that around bases of antennae there is a dark brown area extending to the eyes and fading out on to margin of face. This area has some brown hairs, otherwise facial hairs and beard white. Antennae (Text-fig. 44): black, basal segments rather reddish, segments 4-7 rather short. Palpi greyish or whitish, with mainly black hairs.

Thorax. Mesonotum and pleura reddish brown, patterned as in *exagens*.

Abdomen. Brown, somewhat reddish basally. Base of second segment and hind margins and side margins of other segments narrowly white; also white, white-haired triangles on second to fifth segments, one more than in *exagens*. Venter reddish with mostly white hairs.

Legs. Reddish brown, tarsi darker, femora with greenish grey dusting. Hairs of femora and tibiae largely white.

Wings. Faintly browned, with deeper colour near apex, and with small clouds on R_4 and at apex of discal cell.

Length. Body 14 mm.; wing 11 mm.

Holotype and six female paratypes from Angoram (Christian) are in the School of Public Health and Tropical Medicine, Sydney. One paratype female from Nazab, Markham R. valley, July, 1944 (Krombein) is in the U.S. National Museum.

TABANUS COHAERENS.

Tabanus cohaerens Walker, 1865, *Proc. Linn. Soc. Lond.*, viii, p. 177; Ricardo, 1912, *Bijd. Dierk.*, 19, p. 71; 1913; *Nova Guinea*, ix, zool. 3, p. 389; Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 220.

Atylotus picticornis Bigot, 1892, *Mem. Soc. zool. France*, v, p. 671.

Atylotus alfourensis Bigot, 1892, *Mem. Soc. zool. France*, v, p. 672.

A rather small species (12 mm.), brown or dark brown, with the median spots of the abdomen more or less distinctly united into a parallel-sided stripe. This species seems to be widespread in New Guinea and rather variable. Two variants are here given specific rank: *divisus* Ric., separated by the absence of golden hairs on the mesonotum and a different antennal shape; and *approximatus*, n. sp., distinguished by its more tapering frons and darker colour.

♀. *Head*. Frons proportions 11:8:65, index 8. Callus club-shaped, elongate, brown, lighter at base. Tomentum of frons yellowish, more greyish towards vertex, with dark brown hairs. Subcallus and parafacials a golden brown, face and buccae white. Hairs similar in colour. Antennae orange with black hairs (Text-fig. 10). Palpi yellowish with black hairs.

Thorax. Mesonotum greyish brown with fine black hairs and recumbent yellowish hairs, the latter more numerous posteriorly and around scutellum. Pleura grey, hairs yellowish on upper sclerites, silvery on lower ones.

Abdomen. Yellow-brown with mainly black hairs. Hind margins and lateral margins with a few whitish hairs and each segment with an elongate median pale triangle; viewed from behind, these triangles unite into a narrow, parallel-sided median stripe.

Legs. Yellow-brown, femora slightly greyish; forelegs darker, with femora rather blackish and tarsi and tips of tibiae black. Middle and hind femora and inner faces of tibiae with yellowish hairs, otherwise hairs mostly black.

Wings. Pale yellowish, foreborder near apex is darker. Appendix very small or absent.

Length. Body 12 mm.; wing 11 mm.

In the British Museum are the holotype female, "New Guinea" (Wallace); one female from Lorentz's Rivierkamp; one female, Etna Bay (N.G. Exp., 1906); three females, Cyclops Mts., Sabron, 930 ft., iv.1936; one female, Lake Sentani, Ifar, viii.1936 (Cheesman). Also present are the types of Bigot's two species and four other females from his collection. Unfortunately, owing to Bigot's dislike of precise localities, his specimens are labelled simply "New Guinea".

In the School of Public Health and Tropical Medicine, Sydney, are two females, W. Papua, Kiwani Is. (Stewart); one female, Nth. N.G., Prauwenbivak, 1920 (v. Heurn); one female, Hollandia (coll. ?); one female, Angoram (Christian).

In the Archbold collection, five females, Hollandia, vii.1938 (Toxopeus).

Miss Ricardo records this species from Ceram (Mrs. L. F. de Beaufort).

TABANUS APPROXIMATUS, n. sp.

I erect this new species for a number of specimens from Angoram, which differ from *cohaerens* Wlk. in the more tapering frons, the more linear callus, the shape and colour of the antennae, and the slightly larger size and darker colour. That this is not merely a local form is indicated by the fact that a normal *cohaerens* was taken at Angoram by Mr. S. H. Christian (see above). It does not seem to be the same as the form of *cohaerens* from Mamberamo recorded by Shuurmans Stekhoven (1926, p. 222), although his Figure 92 shows both forms of callus. It differs from *brunneothorax* S.S. (Buru) in the shape of the frons and callus.

♀. *Head.* Frons proportions 10:6:70, index $11\frac{1}{2}$, tapering to little more than half as broad at antennae. Callus almost linear (Text-fig. 42), dark brown. Tomentum of frons grey or blackish, with mixed black and yellow hairs. Subcallus with brown tomentum, face, parafacials and buccae with white tomentum and white hairs. Antennae (Text-fig. 42): a deeper red than those of *cohaerens*, third segment rather broader, following segments together distinctly shorter.

Thorax. Mesonotum chocolate-brown, humeri and notopleural calli orange. Short black hairs, thickly mingled with greenish, recumbent hairs, which are thickest posteriorly. Pleura with grey tomentum and mainly white hairs, some yellowish near wing base, and a few black on mesopleuron.

Abdomen. Dorsum a darker mahogany-brown than *cohaerens*, with mainly black hairs; a few yellow hairs laterally and in inconspicuous median triangles which form only an indistinct stripe. Venter more yellow with mainly yellow hairs.

Legs. Reddish yellow, fore femora, tip of fore tibiae, and all tarsi darker, all femora with some greyish dusting. Femora with some rather long white hairs, tibiae with shorter hairs, partly yellow and partly black.

Wings. Membrane rather darker than in *cohaerens*, pale brown rather than pale yellow, a deeper brown anteriorly. No appendix in any of the specimens I have seen.

Length. Body 14 mm.; wing 12 mm.

In the School of Public Health and Tropical Medicine, Sydney, are the holotype female and four males, four female paratypes, all from Angoram (Christian).

TABANUS DIVISUS.

Tabanus divisus Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 392; Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 335.

Miss Ricardo says of *divisus* that it is distinguished from *cohaerens* Wlk. by being darker and by having the frons only half as broad at the antennae as it is at vertex. These differences also apply to my new species *approximatus*, and it may be that this is no more than a form of *divisus*. The two can, however, be separated,

because *divisus* is smaller; the pale hairs of the abdomen are white, not yellow; the median, white-haired triangles are continued into a stripe by a paler area of the ground-colour; the mesonotum has much less conspicuous recumbent golden hairs, and the first antennal segment is paler, relatively longer and narrower.

♀. *Head.* Frons proportions 10:7:62, index 9. Callus (Text-fig. 11) almost linear. Tomentum of frons pale yellowish, hairs black. Subcallus and adjoining parts of parafacials golden-brown, latter with a few black hairs. Rest of parafacials, buccae and face white, with white hairs. Antennae (Text-fig. 11): first segment pale yellow, relatively longer and narrower than in *cohaerens*; second and third segments bright orange, following segments slightly darker. Palpi tapering, white but on outer face with a blue-grey sheen and black hairs.

Thorax. Mesonotum grey-brown, humeri and notopleural calli orange. Clothed with fine, erect black hairs and a few recumbent golden yellow hairs are visible, but not nearly so conspicuous as in the two allied species. Pleura with the hairs mainly white, a few blackish on mesopleuron.

Abdomen. Ground colour dark brown, with base of second segment narrowly pale and a faint median pale stripe that can be seen under the microscope, but is not obvious to the naked eye. Hairs dark brown, except for whitish tufts laterally and a small triangle of whitish hairs in the middle of each segment. These triangles are easily seen, but not the pale stripe connecting them. Venter reddish basally, blackish apically, with hairs brown except on segmentations, where they are longer and whitish.

Legs. Reddish yellow, femora somewhat dusted. Fore femora, apical third of fore tibiae, and fore tarsi darker. Femora with some white hairs, otherwise hairs of legs mainly black.

Wings. Browned, faintly except along fore border and up to vein R_4 , where brown colour is darker.

Length. Body 12 mm.; wing 10 mm.

Apparently only the original type material of this species has yet been seen. It was "a long series of specimens" from various localities of the Lorentz Expedition, such as Lorentz R., Regen Is., Digul R., etc. Stekhoven says the type is in the British Museum, but one of the three specimens there is labelled "Paratype". There is nothing in Miss Ricardo's statement by which we could identify one particular specimen as the Holotype.

TABANUS LENTICULATUS, n. sp.

A middle-sized, blackish brown species, with a single row of fairly distinct median triangles, and dark wings. The third antennal segment is black, broad, with a prominent tooth, and the following segments relatively short.

♀. *Head.* Frons proportions 13:13:74, index $5\frac{3}{4}$, parallel. Callus broad, flask-shaped, with a stout linear extension (Text-fig. 35). Tomentum of frons white anteriorly, blackish posteriorly, with black hairs. Golden-brown tomentum about bases of antennae, otherwise tomentum of subcallus and facial area white or whitish. Parafacial hairs mainly black, hairs otherwise white. Antennae (Text-fig. 35): first segment very broad, with prominent dorsal angle; second segment small, with long dorsal lobe; third segment broad, with strong tooth, following segments compressed, totalling not more than half the length of the third segment. Palpi swollen basally, tapering rather quickly to a short point, white with black hairs.

Thorax. Mahogany-brown with dark grey tomentum, humeri and notopleural calli somewhat paler. Fine hairs black, mingled with recumbent yellowish hairs. Pleura grey, hairs mainly white, but some black on mesopleuron.

Abdomen. Dorsum mahogany-brown with blackish tomentum. Hairs black, except for a median triangle of pale hairs and pale lateral hairs on each of first five or six segments. Venter similar, with pale hairs on segmentations.

Legs. Reddish yellow, tarsi darker, femora with bluish grey dusting. Femora with long white hairs basally and posteriorly, shorter black hairs anteriorly and at tip. Tibiae with black hairs dorsally, some pale hairs ventrally.

Wings. Stained with brown, which is stronger along main veins, at tips of R_{2+3} and R_4 , at base of R_4 , and at apex of discal cell. No appendix. Tegular tuft mainly pale.

Length. Body 15 mm.; wing 13 mm.

Holotype female, Papua, Yule Is., iii.1934 (Cheesman), is in the British Museum. Paratypes from Port Moresby, one female, 30:iv:1947 (Sneddon), two females (Dr. Strong), all in the School of Public Health and Tropical Medicine, Sydney.

TABANUS PRODUCTUS, n. sp.

Closely allied to *patriarchus*, n. sp., and to *opalescens* S.S., but differing in the less tapering frons (Text-figs. 34, 38, 40) and in the shape of the antennal tooth.

♀. *Head.* Frons proportions 14:10:76, index $7\frac{1}{2}$, tapering. Callus rather broad, tapering above into stout linear extension (Text-fig. 38). Tomentum of frons yellowish anteriorly, blackish near vertex, with black hairs. Subcallus and upper parts of parafacials a golden brown, rest of facial area white. Hairs of parafacials black, other hairs white. Antennae (Text-fig. 38): black, third segment with a pronounced tooth, forwardly inclined. Palpi bluish grey with black hairs.

Thorax. Mesonotum grey-brown with reddish patches, humeri and notopleural calli reddish; seen from behind it has a bluish sheen. Erect, short black hairs, sparsely intermingled with recumbent yellow hairs. Pleura grey with faint bluish sheen. Hairs silvery white, except for a few black hairs on mesopleuron.

Abdomen. Dorsum black with a bluish sheen, noticeable on first two segments, but visible on all segments if they are seen from behind. Hairs black, yellow hairs only in very small and indistinct median triangles and on extreme side margins. Venter similar, but with yellow-haired segmentations.

Legs. Black, knees narrowly reddish, femora with a bluish sheen. Hairs mainly black, but white hairs posteriorly on femora.

Wings. Rather strongly browned, except for extreme tip, which is clear. R_4 with long and curved appendix.

Length. Body 13 mm.; wing 13 mm.

Holotype female, Bernhard Camp, 150 ft., 23.xii.1938; one female paratype, Araucaria Camp, 2,400 ft., 22.iii.1939 (both Toxopeus). Type in the Buitenzorg Museum, Java.

TABANUS TRUNCATUS, n. sp.

A small species (10 mm.) with grey-brown thorax and reddish brown abdomen, which bears a row of distinct median pale triangles; segmentations and side margins yellow-haired. Antennae black, third segment broad, following segments compressed together.

♀. *Head.* Frons proportions 10:10:55, parallel. Callus (Text-fig. 39) broadly flask-shaped, with a stout linear extension. Tomentum of frons whitish, more greyish towards vertex, with black hairs. Subcallus and facial area whitish, except for a golden brown area at the bases of the antennae. Parafacial hairs brown, others white. Antennae (Text-fig. 39): two basal segments dark red with black hairs, rest black; basal segments broad with prominent angle, third segment rather broad with blunt tooth, following segments shortened. Palpi rather bluntly pointed, white, with white hairs at base and black hairs over most of surface.

Thorax. Reddish, with dark brown and grey tomentum. Erect black hairs and recumbent silky yellow ones. Pleura greyish, with mainly pale hairs.

Abdomen. Dorsum reddish brown, with a black patch in middle of second segment. Hairs black; a row of large median triangles and narrow segmentations are yellow with yellow hairs. Venter reddish brown, mainly with black hairs, but with some yellow, especially on segmentation.

Legs. Reddish yellow, darker on tarsi, especially fore tarsi and tip of fore tibiae. Femora with some greyish dusting. Hairs mainly long and white on femora, shorter and yellow on tibiae, black on tarsi.

Wings. Only faintly yellowed, with more definite colour on all cross veins and on costa towards wing tip. R_1 without appendix.

Length. Body 12 mm.; wing 10 mm.

♂. Rather similar, but the terminal segments of the antennae are not so contrasting in colour with the rest, and the wing spots are not so distinct.

Holotype female, one male, one female paratypes from Angoram (Christian) are in the School of Public Health and Tropical Medicine, Sydney.

TABANUS PATRIARCHUS, n. sp.

A middle-sized (17 mm.) species, brown-black, with a distinct row of median white-haired abdominal triangles; antennae and femora black; vein R_1 with an appendix.

♀. *Head.* Frons proportions 15:10:78, index 8, strongly tapering. Callus with a small lower portion and a fine linear extension (Text-fig. 40). Tomentum greyish brown, hairs black. Subcallus and parafacials similar, face and buccae grey with white hairs. Antennae (Text-fig. 40): first two segments blackish above, reddish brown below and at base; third segment narrowly bright red at base, rest of antenna black. Palpi blue-black, hairs black.

Thorax. Mesonotum grey-brown with fine black hairs and numerous pale yellowish ones among them. Humeral tuft white, notopleural mainly black. Pleura grey, with mainly white hairs, some black on mesopleuron.

Abdomen. Dorsum dark brown with black hairs. Paler hairs at base of first segment, on side margins, and in shallow median triangles on other segments. To the naked eye these triangles are very prominent against the dark ground colour. Venter dark brown, but with more pale hairs, especially on segmentations.

Legs. Femora bluish black, middle and hind femora narrowly reddish at base and at tip. Rest of legs blackish, except for joints and basal third of fore tibiae. Hairs of femora mainly white, those of rest of legs mainly black.

Wings. Practically hyaline. R_1 with appendix of variable length.

Length. Body 16–17 mm.; wing 14 mm.

♂. Similar, except that antennae are slightly more slender.

Holotype female, four female and eight male paratypes from Araucaria Camp, 18–24.iii.1939 (Toxopeus) are in the Buitenzorg Museum, Java. In the British Museum are five males from 140° E., 3° 10' S., 900–1,800 ft., Jan., 1937–38, and three males from Humboldt Bay Dt., Bewani Mts., ix.1937 (Stüber); two females, Japen Is., Camp 2, Mt. Eiori, 2,000 ft., x.1938 (Cheesman).

This series is remarkable for the high proportion of males taken. The two Japen specimens, as usual, differ in small details.

TABANUS INFUSCATUS, n. sp.

Differs from *patriarchus*, n. sp., in the parallel-sided frons, the differently shaped callus (Text-figs. 40, 41), and the wings stained with dark brown, and usually without appendix.

♀. *Head.* Frons proportions 13:13:86, index $6\frac{1}{2}$. Callus elongate, flask-shaped, narrowing into a long median extension (Text-fig. 41). Tomentum of frons yellow-brown, hairs black. Subcallus and parafacials yellow-brown with black hairs, face and buccae white with pale yellowish hairs. Antennae (Text-fig. 41): first two segments red-brown with black hairs, third and following segments missing in all female specimens available. Palpi bluish grey with black hairs.

Thorax. Mesonotum with tomentum and mixed black and pale yellow hairs. Pleura grey, with mainly white hairs, some black on mesopleuron.

Abdomen. Blacker than in *patriarchus*, with longer black hairs and only a few orange or yellow hairs in the median triangles and on lateral margins of segments. Venter similar, with orange-yellow hairs on segmentations.

Legs. Fore femora bluish black with mainly black hairs. Basal two-thirds of fore tibiae orange, rest of tibiae and whole of tarsi black, with mainly black hairs. Middle leg more reddish, base of femora and tarsi a little blackish, black hairs. Hind femora blackish, tibiae yellowish, tarsi slightly darker.

Wings. Basally and anteriorly heavily stained brown, colour spreading along veins to tip and forming a fairly distinct spot on base of R_4 . R_4 with an almost right-angled bend, but without appendix.

Length. Body 17 mm.; wing 15 mm.

Holotype female and one female paratype from Humboldt Bay Dt., Bewani Mts., 1,200 ft., vii.1937 (Stüber), and one male, Cyclops Mts., Sabron, 930 ft., iv.1936 (Cheesman) are in the British Museum. In the Archbold collection, one female, Bernhard Camp, 150 ft., viii.1938 (Olthof), seems to belong here, but has darker legs, brown pleural hairs, and an appendix to R_4 .

TABANUS SERUS.

Tabanus serus Walker, 1862, *Proc. Linn. Soc. Lond.*, vi, p. 20; Ricardo, 1912, *Bijd. Dierk.*, 19, p. 71; 1913, *Nova Guinea*, ix, zool. 3, p. 398; Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 415.

Tabanus facilis Walker, 1864, *Proc. Linn. Soc. Lond.*, vii, p. 206.

Atyolus laglaisei Bigot, 1892, *Mém. Soc. zool. France*, v, p. 673.

A rather featureless, red-brown species, about 17 mm. long, the reddish abdomen with indistinct triangles of yellow hair, and the whole antennae orange. Within this definition there is considerable variation, and it is possible that a number of allied forms or species are involved. *T. rubriventris* Macq. has a broader frons and different callus (Text-fig. 13), and is darker brown in appearance. *T. daruensis*, n. sp., is perhaps only a form of *serus*, but is smaller and darker. The three type specimens of *serus*, *facilis* and *laglaisei* are all very faded, and the following description is mainly based on modern material.

♀. *Head.* Frons proportions 12:11:83, index $7\frac{1}{2}$, tapering towards antennae. Callus elongate, flask-shaped, diminishing smoothly into a long median extension (cf. *rubriventris*, Text-figs. 13, 15). Subcallus and parafacials golden-brown, latter with black hairs. Buccae and face white, with white hairs. Antennae (Text-fig. 15): bright orange, scarcely darkened at tip, first two segments with black hairs. Palpi whitish, with black hairs.

Thorax. Mesonotum grey-brown, with a fine brown line down the middle and with some yellow tomentum just before the scutellum. Fine, erect black hairs and recumbent yellow ones. Pleura grey with white hairs ventrally, more yellowish ones near wing base, some black hairs on mesopleura.

Abdomen. Dorsum red-brown, closely covered with short black hairs; yellowish hairs are present on segmentations, on side margins and in tiny median triangles. In rubbed specimens the abdomen looks brick-red, through the loss of the black clothing-hairs, and the median triangles may be lost. Venter similar, with longer yellow hairs on segmentations.

Legs. Some black hairs on coxae. Femora reddish, hind femora with a little blue-grey dusting. Hairs mixed, short black and longer yellowish. Tibiae and tarsi similar, with more numerous black hairs. Fore-legs with the tarsi and apical third of the tibiae darkened.

Wings. Stained yellow or pale yellow-brown, darkened at tips of veins and on fore margin, stigma clear yellow. No appendix, though R_4 has a right-angled bend.

Length. Body 16-17 mm.; wing 14 mm.

In the British Museum are the types of the three synonymic species, Walker's two types being from Mysol (Wallace) and Bigot's type from Waigeu. There are also one female, "New Guinea" (Wallace); two males from Papua, Kokoda, 1,200 ft.,

viii.1933; 13 females Waigeu, Camp Nok, 2,500 ft., iv.1938 (all Cheesman); one female, Bewani Mts., 1,200 ft., vii.1933 (Stüber). In the School of Public Health and Tropical Medicine, Sydney, are two females, Prauwenbivak, 1920 (v. Heurn); one female, Lae (Clinton); one female, Mamberamo, Albatros Bivak, v.1926 (v. Leeuwen).

The Archbold Expedition took a good series of this species at Bernhard Camp, Aug.-Nov., 1938 (Olthof) and April, 1938 (Toxopeus)—49 females in all; also one female, Araucaria Camp, 2,500 ft., 18.iii.1938 (Toxopeus).

TABANUS REBRIVENTRIS.

Tabanus rubriventris Macquart, 1838, *Mém. Soc. roy. Agric. Arts Lille*, 1838 (2), p. 135, and *Dipt. Exot.*, 1, p. 131; de Meijere, 1906, *Nova Guinea*, v, p. 74; Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 417.

Tabanus novaeguineensis Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 399.

Very close to *serus*, but distinguished by having a broader, less tapering frons, the callus shorter and more square, reaching the eyes and not tapered smoothly into the linear extension, beard brown, fore femora blackish; third antennal segment more slender, tooth weaker (Text-fig. 13). Macquart in his original description says that the tarsi and tip of the tibiae of the hind legs are blackish, but an annotation by the late Major E. E. Austen queries whether this should not read: "anterieures" instead of "posterieures".

T. serus Wlk. may be no more than a form of *rubriventris*, but the differences are clear-cut. There is, for example, no difficulty in picking out the single Waigeu specimen of *rubriventris* from the series of *T. serus* from the same locality.

Macquart's type of *rubriventris* was from Papua, Offak. No locality is given by de Meijere for his material. Ricardo's type of *novaeguineensis* was from Lorentz R., Bivak Is. In the British Museum are two female paratypes of *Novaeguineensis* from Bivak Is., and one female from Waigeu, Camp Nok, 2,500 ft. (Cheesman).

TABANUS INDISTINCTUS.

Tabanus indistinctus Bigot, 1892, *Mém. Soc. zool. France*, v, p. 639, Ricardo, 1911, *Nova Guinea*, ix, zool. 3, p. 394; Schuurmans Stekhoven, 1926, *Treubia* vi, suppl., p. 382.

Represented by a single female specimen, which must have been quite immature when caught, and which is now shrivelled. The colour of the hair is fairly well defined, but the coloration of the sclerites and the wings has probably never been properly developed. It is therefore useless to describe the colours of tomentum or sclerites.

♀. *Head*. Frons proportions 12:9:69, index $7\frac{1}{2}$, tapering. Callus (Text-fig. 14) pale yellow. Hairs of frons, parafacials and beard dark brown, face with some long brown hairs scattered over it. Antennae (Text-fig. 14): with black hairs, apparently first two segments are brown, third somewhat orange basally, darkened apically, terminal segments darkened. Palpi with black hairs.

Thorax. Mesonotum with longish black hairs, perhaps some silky yellow ones intermingled; postalar calli with some whitish hairs. Pleura with mainly brown or brownish hairs, white tuft on metapleuron.

Abdomen. Dorsum with black hairs, whitish hairs only in small median and lateral triangles, and sparsely along hind margins of segments. Venter with black hairs and thick marginal fringes of whitish hairs.

Legs. With entirely black hairs.

Wings. Appear entirely clear, though it may be that the colour has not developed. Veins pale yellow. R_1 with short appendix.

Length. Body 14 mm.; wing 12 mm.

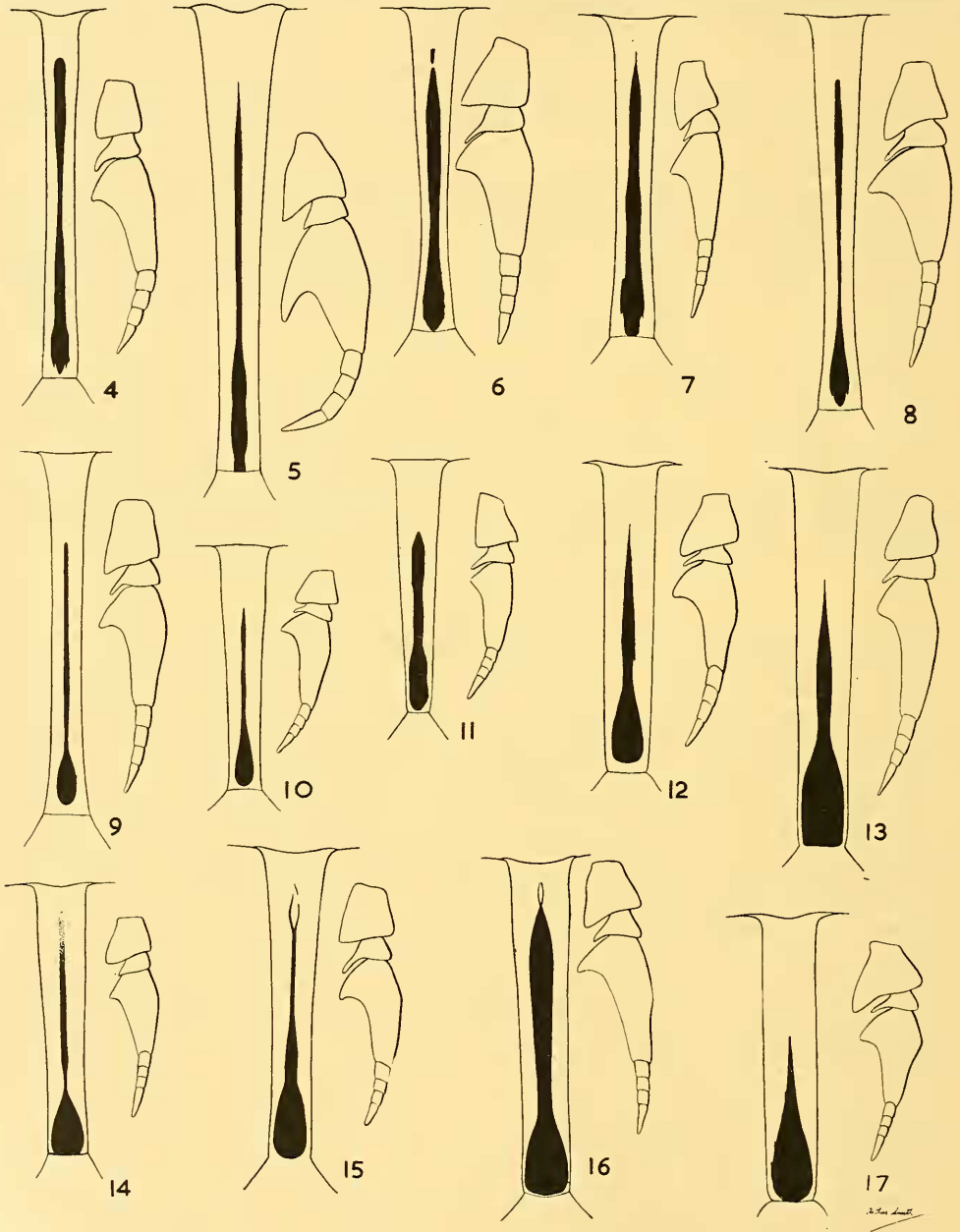
Holotype ♀ from Doré (Laglaise) is in the British Museum.

I am not able to throw much light on the identity of this species. Stekhoven compares it with *divisus* Ric., but I am more inclined to place it near to, if not as a form of, *serus* Walk. The short, dark beard is a difference. In this respect it agrees with *rubriventris* Macq., but has not the elongate third antennal segment, nor the yellow abdominal triangles of that species.

TABANUS DARUENSIS, n. sp.

Smaller than *serus* or *rubriventris*, with a different structure of antennae and palpi.

♀. Head. Frons proportions 13:11:72, index $6\frac{1}{2}$. Callus as in Text-fig. 43. Tomentum of frons yellowish anteriorly, black at vertex, with black hairs. Subcallus with pale golden tomentum, parafacials, face and buccae white, with white hairs and beard.



Text-figures 4-17.

Figs. 4-17. Frons and antenna of female: 4, *T. angusticallosus* S.S.; 5, *T. aurivittatus* Ric.; 6, *T. doreicus* Wlk.; 7, *T. furunculigenus* Dol.; 8, *T. wollastoni* Ric.; 9, *T. pollinosus* Ric.; 10, *T. cohaerens* Wlk.; 11, *T. divisus* Ric.; 12, *T. exagens* Wlk.; 13, *T. rubriventris* Macq.; 14, *T. indistinctus* Big.; 15, *T. serus* Wlk.; 16, *T. illustris* Wlk.; 17, *T. semicircularis* Ric.

Antennae (Text-fig. 43): terminal segments unusually long; first segment brown, with black hairs, and a little tuft of light orange hairs dorsally at tip; second segment orange with black hairs; third and succeeding segments orange.

Thorax. Grey-brown. Humeri and notopleural lobes orange, and an orange spot on each side of the scutum, on the transverse suture; margin of scutellum obscurely reddish. Fine black hairs rather dense, recumbent pale hairs rather longer than usual, but not very conspicuous, except posteriorly. Pleura grey, with mainly grey hairs, except for a few black ones on mesopleuron.

Abdomen. Dorsum orange or reddish, with pale segmentations and pale median triangles. Hairs pale yellowish on pale areas, black elsewhere. Venter basally yellow, apically blackish with black hairs and with white hairs rather abundantly on the hind margins of the segments.

Legs. Fore femora blue-greyish, other femora with a little blue-grey dusting. Legs otherwise yellow, with tarsi slightly darker.

Wings. Only very slightly browned along some of the anterior veins. No appendix to R₁.

Length. Body 14 mm.; wing 12 mm.

Holotype one female, three female paratypes, Daru, Jan., 1927 (Nicholson). Other paratypes: two females Yule Is., Jan., 1927 (Nicholson); one female Wewak (Deland).

TABANUS RUFINOTATUS.

Atylotus rufinotatus Bigot, 1892, *Mém. Soc. zool. France*, v. p. 673; Ricardo, 1914, *Ann. Mag. n. Hist.*, (8) 14, p. 392; 1917, *Ann. Mag. n. Hist.*, (8) 19, p. 219; Hill, 1921, *Bull. ent. Res.* 12, p. 41; Schuurmans Stekhoven, 1926, *Treubia* vi, suppl., p. 148.

Tabanus designatus Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 390; *1912, *Tijdsch. Ent.*, 54, p. 349.

This species is clearly distinguished from any other in New Guinea by its grey colour and the three rows of very conspicuous triangles on the abdomen. It is an offshoot of the Australian fauna, and is common and widely distributed in northern and eastern Australia. For these reasons I have not redescribed it, nor given a detailed synonymy. I understand that Mr. G. H. Hardy intends to do this in his forthcoming paper.

The known New Guinea distribution is Etna Bay and Merauke (Koch: type material of *designatus*. Two paratypes are in the British Museum). In the material from the School of Tropical Medicine, Sydney, is one male from Papua, Port Moresby, 2.i.1918 (no collector's name). These three are isolated coastal localities, but on the mainland this is not exclusively a coastal species. An account of its biology has been given by Hill (1921, *Bull. ent. Res.*, 12, 41-62).

TABANUS CEYLONICUS.

Tabanus ceylonicus Schiner, 1868, *Novara Reise*, Dipt. 93, p. 33; Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 431; Nieschultz, 1931, *Zbl. Bakt.*, (2) 83, pp. 120-125.

Tabanus kershawi Ricardo, 1917, *Ann. Mag. nat. Hist.*, (8) 19, p. 221.

♀. *Head.* Frons proportions 11:8:63, index 8, tapering towards antennae. Callus rectangular, with incised upper border and moderately long median extension (Text-fig. 36). Subcallus slightly swollen, bare, and shining mahogany-brown. Face with light brown tomentum and black hairs. Parafacials dark brown with black hairs, beard black. Palpi dark brown with black hairs.

Thorax. Mesonotum dark brown with black hairs, humeri and parts of postalar calli yellowish. Pleura chocolate-brown, with dark brown hairs.

Abdomen. Dorsally and ventrally dark brown with black hairs, no pattern.

Legs. Femora, tip of fore tibiae and whole of fore tarsi dark brown. Rest of legs white, tips of segments being somewhat reddish yellow. Hairs on darker areas black, those on paler areas white.

* This note, synonymizing *designatus* with *rufinotatus*, was published before the description of *designatus* had appeared on print. *T. elesteem* Summers and *T. lineatus* Taylor are also synonyms, but full references to them are omitted because they concern only the Australian fauna.

Wings. Moderately stained yellowish brown, a heavier patch about middle of R_{2+3} . Costal cell clear yellow.

Length. Body 11 mm.; wing 10 mm.

This species stands apart from all the other Tabanidae occurring in New Guinea. By its striking appearance it would seem isolated enough to justify erecting a separate genus, but its characters are almost entirely chromatic rather than structural. Its range extends from Ceylon through the East Indies to the Solomon Islands and N. Queensland, so that it represents an intrusive element in the New Guinea fauna. Its true systematic position should be determined in relation to Oriental species. For the purposes of this paper it is better to leave it as an isolated member of the genus *Tabanus*.

The variety *nitidulus* Big. has a brown abdomen and yellow hair on the mesonotum. Nieschultz (1931) has described and figured the larva and pupa of this species.

The New Guinea specimens I have seen have the following localities: In the British Museum, one male (var. *nitidulus*), Merauke; 18 females Admiralty Islands (Taylor); six females, Cyclops Mts., Mt. Sabron, 900 ft., v.1936 (Cheesman); one female, Lake Sentani, Iffar, viii.1936 (Cheesman). In the School of Public Health and Tropical Medicine, Sydney, are 23 females, Manus Is., Admiralty Islands (Deland); three females, Kavieng, New Ireland (Taylor); one female Sauri, Wewak (Taylor); one female Idenburg R., Ter Poorter (1911); one female Boeroe, Denig, viii.1913. In the Archbold Collection 13 females, Bernhard Camp, 150 ft., ix.1938 (Olthof). In U.S. Nat. Museum Collection, one female, Cyclops Mts., 1,000 ft., April, 1945 (Jean Laffoon). In the S. Australian Museum two females, Torricelli Mts., 200–1,000 ft., Jan., 1939 (Cheesman); two females, Krisan, Vanimo, April, 1939 (Cheesman).

The New Guinea localities quoted by Stekhoven are the Lorentz area, Etna Bay, Prauwen Bivak, Merauke, Hollandia and the Idenburg River.

GENUS NEOBOLBODIMYIA.

Neobolbodimyia Ricardo, 1912, *Nova Guinea*, ix, zool. 3, p. 402; Schuurmans Stekhoven, 1926. *Treubia* vi, suppl., p. 135. Genotype: *N. nigra* Ricardo by original designation.

This is an isolated and little-known genus, founded for one specimen from the Lorentz collection, and distinguished by having not only a bulbous subcallus, upon which the antennae stand, but a greatly swollen first antennal segment as well. These swellings of the frons and its appendages occur sporadically in otherwise dissimilar species, and it is difficult to know when they really indicate relationship. In this instance the body-shape and heavily patterned wings, combined with the head characters, justify the genus, but, in spite of its name, it is not closely allied to *Bolbodimyia* from S. America.

N. veitchi Bezzi, from Fiji, was described in this genus because it has swollen first antennal segments, but it differs in many other ways, as Bezzi points out. I do not think it belongs in *Neobolbodimyia*. Similar considerations apply to *N. laticornis* S.S. and *N. argentata* Szilady, both from Celebes, neither of which is known to me.

NEOBOLBODIMYIA NIGRA.

Neobolbodimyia nigra Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 403; Surcouf, 1921, *Genera Insectorum*, 175, Tabanidae, p. 94.

This species is hitherto known from the unique female type, which has been independently described by Ricardo (1913), Surcouf (1921) and Stekhoven (1926). The type locality is "Bivak Island", which I assume to be one of the camp sites of the Lorentz Expedition, somewhere in the general area of Regen Island and the Lorentz R. (05°S, 139°E). Surcouf misquotes this as: "Ile Bivals (Archipel de la Nouvelle Guinée)" at the beginning of his account, and at the end adds: "Type: un exemplaire femelle de la Nouvelle-Calédonie". I am not clear whether the latter is a mistake, or whether "Type" refers to an additional specimen seen by him.

The two specimens before me are males, so I am able to give a description of this sex. I have not seen the female, but from descriptions the male differs in having lateral thoracic patches of yellow hair, and in its general mahogany colour instead of black.

♂. *Head*. Eyes contiguous, clearly divided into a lighter brown upper area of large facets and a darker brown lower area of small facets. Dried specimens show no trace of the eyebands. Face reddish brown with white tomentum, slightly bulbous, with median groove. Parafacials black with white tomentum and dark brown hairs. Occiput similar, with yellow hairs. Antennae standing on a very prominent bulbous callosity, which is shining mahogany-brown, with brownish tomentum beneath. First antennal segment bulbous, one and a half times as long as its greatest width, shining mahogany-brown with black hairs; second and third segments about half as thick, *Tabanus*-like in shape, pale yellow, with black hairs. Palpi short, first segment blackish, second segment swollen, pointed at tip, orange with black hairs. Proboscis short, labella broad, reddish.

Thorax. Shining mahogany-brown, faintly dusted on dorsum and more thickly on pleura. Hairs long, silky and dark brown, except for a tuft of shorter, thicker, yellow hairs on each notopleural lobe.

Abdomen. Shining mahogany-brown with black hairs, tufted on side margins.

Legs. Reddish, with black hairs, femora and coxae darker. Hind tibiae and tarsi with a posterodorsal fringe of short red hairs.

Wings. As in female, dark brown, with an apical clear area covering a little of first submarginal cell and tips of second submarginal, first, second and third posterior cells. Clear spots at base of basal cell, and in centre of fifth posterior cell, and a clear streak crossing basal cells at beginning of discal cell.

Length. Body 13 mm.; wing 12 mm.

The female holotype is in *Natura Artis Magistra*, Amsterdam. In the British Museum are two males from 140°E, 3°10'S, 900–1,800 ft. (Stüber).

Genus PARACANTHOCERA.

Paracanthocera Enderlein, 1923, *Deutsch. ent. Zeitschr.* 1923, p. 545; *Mitt. zool. Mus. Berlin*, 11 (2), p. 332; Ferguson, 1926, *Bull. ent. Res.*, 16 (4), p. 301. Genotype: *Acanthocera australis* Ric., by original designation.

This genus, as understood by Enderlein, rests upon a misapprehension. The third antennal segments of Ricardo's type and paratype were missing when the species was described, and her reasons for placing the species in the genus *Acanthocera* were that: "Owing to the strong general resemblance, especially in the markings of the wings . . . (it) . . . no doubt belongs to this genus." A specimen in the British Museum from Kuranda, N. Queensland (Dodg), agrees with Ricardo's type, but has antennae quite unlike those of *Acanthocera*, and without any tooth-like projection. This removes the species from Enderlein's tribe Acanthocerini into his Diachlorini.

Ferguson (1926) says: "*Paracanthocera* . . . will probably prove valid, but it is doubtful if the actual species is known to Enderlein." This is a fair statement of the position: the genus should be retained, but needs to be redefined, from the type species.

In Enderlein's tribe Diachlorini this species runs to *Lissimas* End., but differs from the description of that genus in the shape of the palpi and in the type of wing pattern. The distinguishing characters of *Paracanthocera* are: the long first antennal segment, 3.3 times as long as its greatest width, almost parallel; frons index 4. No ocelli or ocellar tubercule. Callus pear-shaped and distinctly swollen in profile. Subcallus not swollen, rather bare. Face swollen, bare, shining. Proboscis short. Palpi same length as proboscis, much swollen basally. Wings mainly brown, with clear spots.

The type of *Chrysops parallelus* Walk. is in very bad condition. It has no head, the right wing is lost, and the left wing very badly torn. It seems clearly very close to *P. australis*, but the following difference can be seen: clear spot at base of basal cell smaller, that at extreme base of cell R_1 does not extend beyond beginning of R_{2+3} , and is even then not completely clear; brown colour fills basal third of cell R_4 , and generally seems to extend nearer to the wing border. Admittedly I risk falling into the same error as Miss Ricardo when I assume the generic position of this headless and broken specimen, but the probability of being correct seems a little stronger.

P. australis Ric. occurs in N. Queensland, and *P. parallelus* Wlk. was described from Batjan Is., in the Malay Archipelago. I have not seen the genus among New Guinea material.

Genus CHALYBOSOMA, gen. nov.

Genotype: *Tabanus metallicus* Ricardo, by present designation.

Eyes bare. Frons almost parallel-sided, very slightly widened towards antennae, index about 4. Callus elongate, club-shaped (Text-figs. 18, 57, 58). Vertex thickly tomented, no ocelli nor ocellar callus. Subcallus moderately swollen, bare, and shining brown. Face bare, and shining in middle, and in a spot near each tentorial pit. Antenna *Tabanus*-like, but first segment rather elongate, slightly longer than broad in side view, third segment slightly elongate, but with distinct tooth (Text-figs. 18, 57, 58). Palpi elongate, tubular. Proboscis little longer than palpi, labella occupying half total length of proboscis. Thorax and abdomen more or less extensively metallic green or blue, with some non-metallic pale areas. Legs mainly dark, tarsi with sharply contrasting white basal area, not appreciably flattened. Wing mainly hyaline, anal cell distinctly closed and stalked. Subepaulet bare.

I erect this genus for a group of metallic green or blue species. Metallic coloration is not peculiar to these species of the Tabanidae, and, indeed, occurs sporadically in other predominantly non-metallic families, such as the Asilidae and Syrphidae, but in conjunction with the structural details given above it, serves to separate off three New Guinea species from the rest. I am not prepared to say that *T. cyaneus* Wied., from Queensland, should be referred to *Chalybosoma*; it is larger and more robust in build, and the first antennal segment is stouter.

KEY TO THE SPECIES OF CHALYBOSOMA.

1. Mesonotum extensively dull yellow at sides, and before scutellum, rest of mesonotum and scutellum metallic. Vein R_4 with very short appendix *malkini*, n. sp.
Mesonotum entirely metallic, except for humeri and notopleural lobes, no extensive yellow areas to be seen from above. Abdomen entirely metallic or with a pale transverse band basally. Vein R_4 without appendix 2
2. Abdomen entirely metallic, or with only a faint trace of pale, non-metallic colouring at base of second segment. Antennae uniformly orange, including terminal segments. Palpi black-brown or black-haired *metallicum* Ric.
Abdomen with a distinct, pale, non-metallic transverse band at base of second segment. Antennae more brownish, terminal segments distinctly darker. Palpi white-haired *luciliaeformis* S.S.

CHALYBOSOMA METALLICUM.

Tabanus metallicus Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 393; Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 503.

♀. *Head*. Frons proportions 12:13:48, index 4. Callus dark brown with thick linear extension (Text-fig. 18). Vertex with a thinning of the tomentum, but without ocelli or ocellar callus. Subcallus bare and shining, paler brown, only tomented along eye-margins. Central area of face, and a small spot adjoining tentorial pit on each side, is bare, shining pale brown. Rest of frons and face with yellowish white tomentum and pale yellow hairs. Antennae (Text-fig. 18): First two segments pale brown with black hairs above, yellow ones below; third segment bright orange with fine white hairs, remaining segments only slightly darker. Palpi brown with brown or black hairs. Proboscis little longer than palpi, labella being about half total length.

Thorax. Humeri orange with yellow hairs; notopleural lobes pale yellow with conspicuous yellow hairs and a small tuft of black hairs just before wing-base; postalar callosities dull reddish with black hairs. Pleura less completely metallic, with a number of pale areas. Hairs black in a stripe from notopleuron down over mesopleuron and sternopleuron, elsewhere yellow or whitish. Stekhoven refers to: "A black-haired patch . . . just underneath the wings", which he contrasts with the yellow hairs in that position in *luciliaeformis*. This must presumably refer to the black hairs on the mesopleuron (i.e., strictly before the wing), but these are also black in the specimens I identify as being *luciliaeformis*.

Abdomen. Metallic blue-green, with black hairs. Slightly reddish on anterior margin of first and second segments, and more extensively so ventrally.

Legs. Dark brown or black, with black hairs. Tibiae basally white with white hairs. White area of tibiae is one-half on foreleg, two-thirds on middle, and one-quarter on hind leg.

Wings. Clear, except for stigma and for brown colour filling the whole of the costal and first basal cells, most of second basal, and a little of anal.

Length. Body 9 mm.; wing 9 mm.

In the British Museum, one holotype female, Iwaka R. (Wollaston).

CHALYBOSOMA LUCILIAEFORMIS.

Chalybosoma luciliaeformis Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 504.

Differs from *metallicum* Ric. in the characters given in the key. I have already mentioned that Stekhoven says there is a white-haired tuft "just underneath the wings", but in my specimens the pleural hairs are like those of *metallicum*.

This species was founded for two paratypes of *metallicum* Ric., which are in Natura Artis Magistra in Amsterdam, and which I have not seen. The type-locality is Alkmaar. In the Archbold collection are two females, one male from Araucaria Camp, 2,400 ft., 15-22.iii.1939 (Toxopeus). The male is very like the female, but the eyes have a dense, silvery pubescence.

CHALYBOSOMA MALKINI, n. sp.

Has a transverse pale band on the second abdominal segment, and is very similar to *luciliaeformis* in nearly every detail, except the two mentioned in the key. At first I was inclined to regard these specimens as immature examples of *luciliaeformis*, in which the metallic colour of the thorax was not fully developed, but this would not explain the presence of an appendix to R₄. The colour differences are quite constant in specimens from very different localities. Moreover, the male of *luciliaeformis* and the male of *malkini* are both from the same locality, same date, both immature, yet they show quite clearly the differences cited. The eyes have silvery hairs.

Holotype female, one female paratype Hollandia, April, 1945 (Malkin), are in the U.S. Nat. Museum. In the Archbold Collection one male from Araucaria Camp, 7,500 ft., 18.iii.1939 (Toxopeus). In British Museum, one female paratype, Papua, Kokoda, 1,200 ft., vi.1933 (Cheesman).

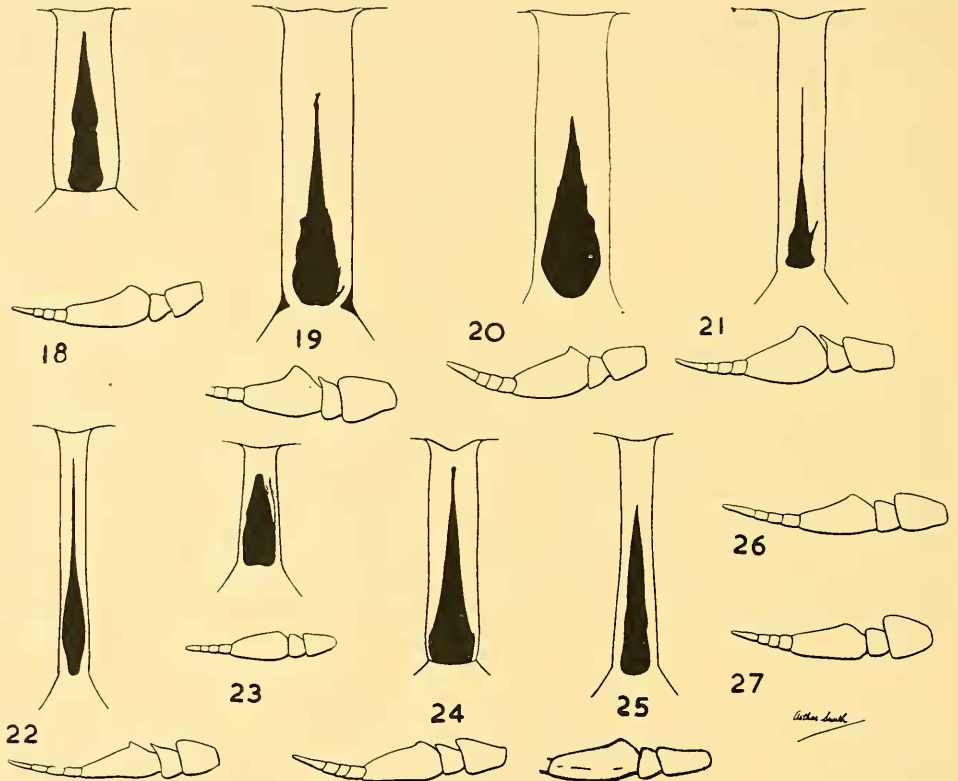
Genera CHASMA and CHASMIELLA.

Chasmiella } Enderlein, 1922, *Mitt. zool. Mus. Berlin*, 10 (2), p. 344; 1925, *Mitt. zool. Musm.*
Chasmia } *Berlin*, 11 (2), p. 331.

KEY TO SPECIES.

1. First antennal segment twice as long as thick, cylindrical. Third antennal segment nearly parallel-sided, tooth insignificant. (One species: dark brown, notopleural lobes white, abdomen with white transverse band overlapping first and second segments, and a narrower band at hind margin of second segment.) CHIASMA End. (*basifasciatus* de Meij. = *bicincta* End.)
- First antennal segment not twice as long as thick, subtriangular, as in *Tabanus*. Third antennal segment with more or less distinct tooth CHASMIELLA End. 2
2. Mesonotum without conspicuous stripes, though the median third may be darker than the sides. Scutellum not strongly contrasting with mesonotum 3
- Mesonotum with three conspicuous black stripes on a yellow ground. Scutellum black, contrasting strongly with mesonotum 9
3. Pleura unicolorous, yellow or grey 4
- Pleura not unicolorous, but with a vertical brown stripe passing down mesopleuron, just in front of wing base 7
4. Pleura grey. Radial fork rectangular, with a suggestion of appendix *papouinus* Wlk. Pleura yellow. Radial fork shallow, no appendix 5
5. Almost the whole frons bare and shining, only a small area of tomentum near the median ocellus *ochrothorax* S.S. Shining callus not taking up whole of frons 6
6. Palpi (♀) yellow, with yellow hairs. Stigma clear yellow-brown *subhastata*, n. sp. Palpi (♀) blackish, with black hairs. Stigma dark brown *parva*, n. sp.

7. Face bare and shining *fulgidus* Ric.
 Face tomented, not shining 8
8. Smaller (7 mm.), dark brown species. Abdomen shining dark brown, first segment with pale hind margin and with white hairs centrally *raffrayi* Bigot
 Larger (9 mm.), pale species. First to third abdominal segments yellow both dorsally and ventrally *breviusculus* Wlk.
9. Mesopleura partly brown, with black hairs posteriorly. Fore femora blackish, contrasting with yellow coxae *fasciata*, n. sp.
 Mesopleuron entirely yellow, with yellow hairs. Fore femora mainly yellow, like coxae, but darkened at tip *parvicallosa*, n. sp.



Text-figures 18-27.

Figs. 18-27. Frons and antenna of female: 18, *Chalybosoma metallica* Ric. (subcallus not shown); 19, *Cyd. lorentzi* Ric.; 20, *Cyd. albithorax* Ric.; 21, *Cyd. sol.* S.S.; 22, *Cyd. solomonensis* Ric.; 23, *Chasmiella fulgidus* Ric.; 24, *Cyd. laetus* de Meij.; 25, *Ch. raffrayi* Big. (type). Antenna of male: 26, *Ch. papouinus* Wlk.; 27, *Ch. insurgens* Wlk.

CHASMIA BASIFASCIATA.

Tabanus basifasciatus de Meijere, 1915, *Tijdschr. v. Ent.* 58, p. 107; Schuurmans Stekhoven, 1926, *Treubia* vi, suppl., p. 281.

Chasmiella bicincta Enderlein, 1922, *Mitt. zool. Mus. Berlin* 10 (2), p. 344; (*nomen nudum*); 1925, *Mitt. zool. Mus. Berlin*, 11 (2), p. 331. New synonymy.

I am recognizing both the above species from descriptions, but the species is rather distinctive, in colour pattern, in structure of the antennae, and in length of wings.

♀. *Head*. Frons proportions 8:10:32, index 3, diverging. Callus spear-shaped, dark brown, filling the frons anteriorly. Tomentum of frons white, with some very short blackish hairs. Subcallus and extreme sides of parafacials, along eye margins, with yellowish grey tomentum, greater part of face and parafacials shining brown, rather swollen. Buccae with brown, then white tomentum, beard sparse, black. Antennae (Text-fig. 46): clear yellow basally, becoming darker on apical half of third segment, and blackish on following segments. Palpi slender, dark brown, with dark brown hairs.

Thorax. Mesonotum dark reddish brown, notopleural lobes and hind margin of scutum whitish; scutellum dark reddish brown, contrasting with white colour immediately in front of it. Sparse short black hairs, white hairs at sides, especially on notopleuron. Pleura dark brown with grey tomentum, except for a vertical brown stripe below the wing base. Hairs black on pteropleura, white on meso- and metapleura.

Abdomen. Shining dark brown, with a whitish transverse band, including hind margin of first segment and fore margin of second segment. Hind margin of second segment also whitish, but the extent of this is variable. Genitalia, which are just visible, are yellowish white. Hairs dark brown, white on white band. Venter similar, but the white transverse band broadened to include most of the first sternite.

Legs. Including coxae, black-brown with dark brown hairs, only knees very narrowly paler.

Wings. Pale at base, but yellow in costal cell and pale yellow-brown from base of discal cell to tip. Colour rather stronger along cross-veins. Anal cell open. R_4 without appendix.

Length. Body 8 mm.; wing 9 mm.

Enderlein's type material, in the Zoologisches Museum, Berlin, is said to be from Grat, 3,500 ft., 28.xi.1912; Lordberg, 8-10.xii.1912; Meanderburg, 3,200 ft., 17.viii.1912—three localities I have not been able to trace. The holotype of de Meijere's species, in *Natura Artis Magistra*, Amsterdam, is from Bougainville Mts., 1,600 ft., 1.vi.1910.

In the British Museum are two females, Cyclops Mts., Sabron, 2,000 ft., v.1936 (Cheesman); one female, Humboldt Bay Dt., Bewani Mts., 1,200 ft., vii.1937 (Stüber). In the Archbold Collection two females, Bernhard Camp, 15.xi.1938, 1,800-2,500 ft. (Olthof); mountain slope above Bernhard Camp, 2,200 ft., 25.iii.1939 (Toxopeus).

CHASMIELLA PAPOINUS.

Tabanus papouinus Walker, 1865, *J. Proc. Linn. Soc. Lond.*, viii, p. 108; Osten-Sacken, 1882, *Ann. Mus. civ. Genova*, 16, p. 418; Ricardo, 1913, *Nova Guinea*, 9, p. 401; Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 298.

This is one of Walker's species described from a unique male, and so difficult to relate to a classification based largely on the structure of the female head. The male type is in the British Museum. The grey-dusted, cinereous pleura distinguish it from the rest of this group, and earlier authors have drawn attention to the way in which the small facets of the eye extend in a narrow strip along the hind margin, up to the vertex. Osten-Sacken (1882, p. 418) records a female of this species, from Sorong, in the Vogelkopf, with the remark: "M. Walker describes a male, nevertheless the description agrees tolerably well." Apart from this rather dubious identification no author seems to have recognized the species again, or described a female.

I have not seen a female, but in the material received from the South Australian Museum is a male from N. New Guinea, Mt. Gyifrie, sea-level to 100 ft., April, 1939 (Cheesman), which agrees closely with Walker's type except that the pale hairs of thorax and abdomen are yellowish rather than silvery. The Archbold Expedition also took a male at Hollandia, vii.1938, at sea-level (Toxopeus).

CHASMIELLA OCHROTHORAX.

Tabanus ochrothorax Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 444.

Tabanus brevisculus Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 401, *nec* Walker, 1865.

Distinguished from the other species of this group by the much greater extent of the frontal callus (Text-fig. 45). The raised median ridge can still be distinguished, but almost the whole frons is bare and shining dark brown, only a small area in front of the median ocellus being faintly tomented. Third antennal segment shorter and broader, with a more prominent tooth.

♀. *Head.* Frons proportions 5:8:36, index $4\frac{1}{2}$. Frons (Text-fig. 45) almost entirely bare, shining dark brown, only a small area near the median ocellus being very sparsely tomented. Subcallus and face yellow, with yellow tomentum and hairs. Parafacials brownish, with dark brown hairs. Antennae (Text-fig. 45) yellow, segments beyond the

third reddish yellow, hairs mixed golden and dark brown. Third segment rather short and broad, with pronounced tooth. Palpi yellow, obscured on outer face by rather long, black hairs.

Thorax. Dorsum bright orange, with obscure dark median stripe extending on to scutellum; this can be seen in the paratype in the British Museum, though it is faint, and was not mentioned in the original description. In some other specimens it is more definite. Hairs on stripe mainly brown, laterally yellow. Pleura yellow, with yellow hairs.

Abdomen. Orange on first three tergites, following tergites blackish, lamella orange. Hairs golden on sides of first tergite and anterior side margins of second, otherwise mainly dark brown. Venter similar, with mainly golden hairs.

Legs. Coxae and femora orange, with mainly golden hairs. Tibiae and tarsi dark reddish brown, with black hairs.

Wings. Membrane faintly smoky, very narrowly browned at wing tip. Stigma yellow-brown.

The female holotype, from the Lorentz material, is in *Natura Artis Magistra*, Amsterdam, and other original specimens are in the Rijks Museum of Natural History, Leyden, the Buitenzorg Zoological Museum, and the British Museum. The British Museum has a paratype female from Heuvelbivak, 7-15.xi.09 (Lorentz), and a male from Bivakisland, xii.09; there is also a male from Alkmaar, 2.ii.10 (Lorentz), which Stekhoven made his male type, but I am not sure that it belongs to this species. I am inclined to associate it with *subhastata*, n. sp.

Also in the British Museum are: two females Japen Is., Camp 2, Mt. Eiori, 2,000 ft., x.1938; two females Cyclops Mts., Mt. Lina, 3,500 ft., iii.1936 (Cheesman). In the Archbold Collection are two females from Araucaria Camp, 2,500 ft., iii.1939 (Toxopeus). In the U.S. National Museum one female, Hollandia, April, 1945 (Malkin), two females Cyclops Mts., 1,000 ft. (Jean Laffoon).

There is a fair amount of variation in this series, but I think the variants come within the range of one species. The Japen Is. specimens have a very bright orange mesonotum, with orange hairs here and on the first abdominal segment, and no trace of median darkening. The mainland specimens have abundant short brown hairs on the mesonotum and first abdominal segment. There is variation, too, in the exact shape of the callus at the upper end, and in the extent of the tomentum visible there. The females in the Washington Collection have the callus strongly tapered from the base upwards.

CHASMIELLA SUBHASTATA, n. sp.

Distinguished from *ochrothorax* S.S. chiefly by the much shorter callus (Text-fig. 50), and perhaps only a form of it.

♀. *Head.* Frons proportions 7:8:45, index $5\frac{1}{2}$. Frons grey-dusted, callus shining brown, a long, bare area extending down from vertex. Hairs yellowish. Subcallus dull, tomented, pale yellowish, face and parafacials similar. Hairs brown below the eye, yellow elsewhere. Antennae (Text-fig. 50): first two segments yellow, third more reddish, terminal segments black. Hairs mostly yellow, some black. Palpi orange, slightly darker at tips, with mostly yellow hairs.

Thorax. Dorsum, including scutellum, yellow, obscurely brown in centre-line. Hairs mainly dark brown, golden hairs more numerous near margins. Pleura golden yellow, with golden hairs, no trace of a dark band.

Abdomen. First three tergites and anterior margin of fourth, orange; fourth, fifth and sixth tergites black; extreme tip of abdomen orange. Hairs dark brown, golden on sides and at tip of abdomen, and on hind margin of first tergite, which has a median triangle of yellow hairs. No yellow hairs along margins of other segments. Venter similar, with predominantly yellow hairs.

Legs. Femora yellow, tibiae and tarsi darker, or almost black. Coxae and middle and hind femora with longer golden hairs, rest of legs with shorter black hairs.

Wings. Membrane faintly yellowish, not distinctly smoky anywhere. Stigma clear yellow-brown.

Length. Body 7 mm.; wing 9 mm.

Holotype female and eight female paratypes, Japen Is., Camp 2, Mt. Eiori, 2,000 ft., x.1938; five females Waigeu, Camp Nok, 2,500 ft., iv.1938; one female W. New Guinea, Mt. Nomo, S. of Mt. Bougainville, 700 ft., ii.1936, one female, Papua, Mafulu, 4,000 ft., i.1934 (all Cheesman)—all the above in the British Museum.

In the Archbold Collection are two females, Araucaria Camp, 2,500 ft., 7.iii.1939 (Toxopeus). In the School of Public Health and Tropical Medicine, Sydney, one female, Zoutbron, 20-30.vi.1910 (? coll.). In the South Australian Museum, three females, Mt. Lucreu, 2,000 ft., Jan., 1939; one female, Torricelli Mts., 800 ft., Jan., 1939 (Cheesman).

Some specimens have the darker colour of the mesonotum, abdomen and tibiae less well developed, or almost absent. This variation does not seem to be correlated with locality.

CHASMIELLA PARVA, n. sp.

Again very similar to *ochrothorax* and to *subhastata*, and perhaps no more than a form. The callus is narrower and paler, and set on a narrower frons, further removed from the eye margins (Text-fig. 47). Stigma dark brown, and palpi blackish with black hairs.

♀. *Head.* Frons proportions 8:8:45, index $5\frac{1}{2}$. Frons brownish grey dusted, callus yellow-brown (Text-fig. 47), more slender in outline, and not completely filling frons at its lower end. Barer area at vertex paler and less prominent than in *subhastata*, but median ocellus very well developed. Subcallus and face entirely tomented reddish brown; parafacials with brown tomentum and dark brown hairs. Antennae (Text-fig. 47): third segment with less prominent tooth than in *subhastata*, first two segments yellow, with mostly black, and some yellow hairs, third segment more reddish, rest black. Palpi: first segment yellow, second segment blackish, both with rather dense black hairs.

Thorax. Dorsum, including scutellum, reddish yellow, hairs black on disc, golden at sides and on hind margin. Pleura yellow, with golden hairs.

Abdomen. First three and a half segments orange, the rest black. Anal lamellae orange. Hairs black, golden on side margins and in median triangle on first segment. Venter similar, with golden hairs.

Legs. Coxae yellow, with mainly yellow hairs. Fore femora reddish brown, with mainly black hairs, middle and hind femora yellow with mainly yellow hairs. Tibiae and tarsi reddish brown with black hairs.

Wings. Membrane faintly smoky, distinctly browned along margin, from stigma to wing tip. Stigma dark brown.

Length. Body 8 mm.; wing 9 mm.

Holotype female and six female paratypes, Japen Is., Camp 2, Mt. Eiori, 2,000 ft., x.1938 (Cheesman). A single female from Milne Bay, Feb. 1943 (Mackerras), in the material from Mr. Lee, seems to represent a form of this species, in which the sides of the facial tubercle (i.e., not the parafacials) are bare and shining brown, and the stem of the proboscis appears to be excessively long and thin. I suspect this latter is a distortion. It looks as if the labium had originally been broken off and had been replaced by neatly impaling it on the tip of the stylets.

CHASMIELLA FULGIDUS.

Tabanus fulgidus Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 402; Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 385.

A tiny species with orange, black-tipped antennae; a short, broad, spear-shaped callus; shining face; yellow-brown thorax with blackish scutellum and blackish vertical pleural band; abdomen red-brown, darkened apically; legs dark.

♀. *Head.* Frons proportions 8:10:35, index $3\frac{1}{2}$. Frons grey-dusted, callus shining brown (Text-fig. 23), a longish bare area on the site of the ocellar callus. Hairs pale yellowish. Subcallus dull, tomented, pale yellowish. Face shining, transparent yellow-

brown, bare patch extending a little on to parafacials, rest of parafacials and epistoma with white tomentum, except for a vertical brown band immediately beside the base of the proboscis. Hairs and bristles pale, a few brown ones below the eye. Antennae (Text-fig. 23): orange with brown and yellow hairs, last four flagellar segments black. Palpi blackish on outer side with black hairs, inner face yellowish, bare.

Thorax. Dorsum yellow-brown, rather shining, noticeably white-dusted on humeri, notopleural lobes, and hind margin of scutum. Scutellum blackish, contrasting markedly with scutum. Hairs mixed golden and dark brown, predominantly brown on scutellum. Pleura more whitish than dorsum, except for a broad black band running vertically down from the wing-root. Hairs yellowish.

Abdomen. First and second tergites, and anterior margin of third tergite, yellow, following tergites dark brown, all with brown hairs on disc, and yellow hairs on hind margin, especially in the middle line. Venter similar.

Legs. Dark brown, with hairs same colour. Fore coxae similar, with some yellow hair, middle and hind coxae coloured like pleura, with yellow hair.

Wings. Very faintly smoky along fore border and on basal portion of radial sector. Stigma dark brown.

Length. Body 6-7 mm.; wing 9 mm.

In the two female paratypes the rather distinctive colour-pattern is somewhat faded, and the above description is drawn up from the Japen series, in which the pattern is accentuated. This is particularly noticeable in the dark tips of the antennae, the blackish scutellum, and the more sharply-defined boundary to the light and dark areas of the abdomen. It may be that the island specimens are slightly atypical in this respect.

Holotype female in the *Natura Artis Magistra* Collection is from Heuval Bivak (Lorentz). In the British Museum are two paratypes from the same locality, and 19 females from Japen Is., Camp 2, Mt. Eiori, 2,000 ft., x.1938 (Cheesman).

CHASMIELLA RAFFRAYI.

Tabanus raffrayi Bigot, 1892, *Mém. Soc. zool. France*, v. p. 690; Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 402; Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 291.

Previous authors have seen only the holotype female, which is very badly preserved. The following description is taken from a modern specimen, which I have compared with the type.

♀. *Head.* Frons proportions 8:9:53, index 6. Callus (Text-figs. 25, 48), elongate, tapering, black-brown. Tomentum of frons dark yellow-brown, with yellow hairs. Subcallus with yellow-brown tomentum, face more reddish, hairs brownish. Antennae (Text-figs. 25, 48): first two segments reddish yellow; third segment basally reddish, apically blackish; terminal segments black; from third segment onwards unusually pubescent. Palpi dark brown with black hairs.

Thorax. Mesonotum translucent dark brown, more yellowish laterally and anteriorly, humeri whitish. Hairs short, black. Pleura with a dark brown, brown-haired band running vertically in front of the wing, rest of pleura greyish with white hairs.

Abdomen. Dark brown, slightly paler anteriorly, segments narrowly pale, this margin more pronounced on the first two segments. Hairs black, some white hairs on segmentations. The type and the Mafulu specimen show median triangles, which are barely indicated in the Japen specimens. Venter black-brown, paler basally, with segmentations indistinctly and very narrowly paler, hairs all black (cf. Stekhoven's description).

Legs. Black-brown or obscurely reddish, with black hairs.

Wings. Clear, very slightly yellowed in costal cell and first half of first basal cell. Anal cell just closed or slightly open. Stigma relatively large, dark brown.

Length. Body 7 mm.; wing 9 mm.

All the specimens known to me are in the British Museum. Bigot's female holotype is from "New Guinea"; one female, Papua, Mafulu, 4,000 ft., 1.1934; 16 females, Japen Is., Camp 2, Mt. Eiori, 2,000 ft., x.1938; two females Waifor and Mt. Nok, 2,500 ft., iv.1938 (Cheesman).

CHASMIELLA BREVIUSCULUS.

Tabanus brevisculus Walker, 1865, *J. Proc. Linn. Soc. Lond.*, viii, p. 109; Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 401; Enderlein, 1922, *Mitt. zool. Mus. Berlin*, 10 (2), p. 344; 1925, *Mitt. zool. Mus. Berlin*, 11 (2), p. 331; Schuurmans Stekhoven, 1926, *Treubia* vi, suppl., p. 451. Genotype of *Chasmiella* End., 1922, by original designation.

Distinguished from *fulgidus* Ric. by its larger size, more spindle-like callus and tomented face.

♀. *Head*. Frons proportions 9:8:53, index $6\frac{1}{2}$, parallel. Callus slender, extending half-way towards vertex and occupying only half width of frons at antennae. Rest of face tomented, no distinct bare area at vertex. Median ocellus present. Hairs yellow. Subcallus and face with yellowish brown tomentum, parafacials slightly more blackish, with dark brown hairs. Antennae (Text-fig. 49): first three segments yellow, following segments darker; third segment rather elongate with well-marked tooth; hairs on first two segments chiefly black. Palpi dark reddish brown, with mainly black hairs on both segments.

Thorax. Dorsum brownish yellow with mixed yellow and black hairs in about equal numbers. Pleura yellow, a broad vertical brown stripe through mesopleuron and adjoining parts of pteropleuron and sternopleuron. Hairs yellow, except on upper part of mesopleuron and notopleural lobe.

Abdomen. First three tergites yellow-brown, others dark brown, boundary of light and dark areas rather obscure. Hairs chiefly dark brown, yellow along hind margins and sides of first segment, and on lateral hind margins of other segments. Venter similar, with brown hairs on discs of segments and yellow hairs on hind margins.

Legs. Coxae brownish yellow, with predominantly yellow hairs, some black. All femora dark reddish brown, with mainly black hairs. Fore tibiae and fore and middle tarsi similar; middle and hind tibiae and hind tarsi more yellowish, also with black hairs.

Wings. Membrane distinctly smoky, only a trace of dark brown at extreme wing tip. Stigma yellow-brown. Tegulae, which in other species of this group have rather inconspicuous yellow hair, here have black hair.

Length. Body 9 mm.; wing 10 mm.

Male holotype in the British Museum is labelled "New Guinea" (Wallace). Miss Ricardo associated with it a number of specimens taken by the Lorentz Expedition, but Stekhoven correctly described these as his new species *ochrothorax*.

In the U.S. National Museum collection is a single male from Cyclops Mts., 1,000 ft., March, 1945 (Jean Laffoon), which agrees perfectly with Walker's type. There is a clear vertical brown band on the pleura, emphasized by long brown hairs on the meso- and sternopleura and the notopleural lobe. This distinguishes the species from any other in the genus, except *fulgidus* Ric., from which it differs in the dull tomented face, paler legs, paler stigma. It looks, in fact, bigger and less strongly patterned than *fulgidus*. The fresh specimen shows that the mesonotum—including scutellum—is clothed with rather long, silky, dark brown hairs, which seem to stop abruptly at the level of the transverse suture, leaving the fore margin bare.

I have associated with these males two females in the Archbold collection, from Araucaria Camp, 2,500 ft., 2.iii.1939 (Toxopeus), which are the basis for the description given above.

Enderlein (1922, 1925) erected the genus *Chasmiella* for this species, the subfamily Chasmiinae being characterized by the open anal cell. He cannot have seen Walker's type, which has the anal cell closed and stalked in both wings. His few remarks in explanation of the genus imply that he had specimens of some sort before him, since he refers to the relative length of the antennal segments, and says that exceptionally

the anal cell may be closed on the wing margin. It is a pity that his use of the name *breviusculus* is so dubious, because this group of tiny Tabaninae is distinctive in general appearance, and it should be possible eventually to define it by more reliable characters. The anal cell is open in some specimens before me, but is closed in the majority.

CHASMIELLA FASCIATA, n. sp.

One of two species that are readily recognized by their squat shape and yellow-and-black banded appearance, the black-brown scutellum being very prominent. The present species is further recognized by the banded pleura and black fore femora. The only female specimen is greasy, so, where necessary, reference is made to the male for details of coloration.

♀. *Head.* Frons proportions 11:11:54, index 5, parallel. Callus light brown, tapering (Text-fig. 52). Tomentum of frons golden, black at vertex. Subcallus and facial area golden, a little more blackish on parafacials, a little reddish in middle of face. Beard sparse, black. Antennae (Text-fig. 52): first two segments bright yellow, with black hairs at sides, yellow hairs dorsally and ventrally. Third segment bright orange, terminal segments brown. Palpi orange, with mainly black hairs. Proboscis brown.

Thorax. Mesonotum yellow, with three broad, black-brown, longitudinal stripes; middle one broadest anteriorly, tapering towards scutellum, lateral stripes straight on inner margin, convex on outer. Scutellum entirely black-brown, contrasting strongly with scutum. Short black hairs more numerous on dark stripes, yellow hairs at sides and posteriorly, long black hairs all over scutellum. Pleura yellow, with yellow hairs, but immediately below wing base the anterior half of the mesopleuron is black-brown, with black hairs.

Abdomen. Dorsum black-brown, first two tergites partly or wholly yellow. Hairs mainly black, hind margin of first segment with pale yellow hairs and a yellowish median triangle, other segments with white hairs in a median triangle, and white hairs on the side margins; terminal segments with more numerous white hairs. Venter similar, but without white-haired segmentations and triangles.

Legs. Coxae yellow with pale yellow hairs. Legs otherwise mainly black-brown with black hairs, tibiae of middle and hind legs paler, with dark tips.

Wings. Hyaline with pale yellow stigma.

Length. Body 8 mm.; wing 10 mm.

♂. Closely resembles female, except for the usual secondary sexual differences, chiefly the shorter palpi and longer clothing hairs, which give the body a more woolly appearance.

Holotype female, three male paratypes, Araucaria Camp, 2,500 ft., 18-31.iii.1938 (Toxopeus) are in the Archbold collection. In the British Museum are one male and one female (headless) paratypes from 140° E., 3° 10' S., 900-1,800 ft. (Stüber). In the U.S. National Museum is one female paratype from Nadzab, Markham R. valley, July, 1944 (Krombein).

CHASMIELLA PARVACALLOSA, n. sp.

Allied to *fasciata*, but easily distinguished from it by the form of the callus, the unbanded pleura, the yellow fore femora and the more definitely banded abdomen, especially the clear-cut band on the second segment.

♀. *Head.* Frons proportions 12:12:50, index 4, parallel. Callus (Text-fig. 51) very short, oblong, far removed from the eye margins, pale yellow. Frons bone-yellow, with white tomentum and yellowish hairs. Subcallus and facial area similar, but with black hairs in beard. Antennae (Text-fig. 51): first segment bone-yellow with yellow hairs; second segment light brown with black hairs; third segment bright orange, with well-defined tooth tipped with a few black hairs; terminal segments brown. Palpi white, with black hairs. Proboscis whitish at base, a little brown towards tip.

Thorax. Mesonotum yellow, with stripes of the sort described in *fasciata*, but much more faintly indicated. Scutellum entirely black-brown. Pleura entirely yellow, with yellow hairs, no vertical dark band.

Abdomen. First segment and basal quarter of second tergite yellow, extreme hind margins of other tergites whitish, rest of abdomen black. Boundaries of colour bands more sharply defined than in *fasciata*. Hairs black, rather long, recumbent, pale yellow on yellow bands, and a thick fringe of white hairs along each hind margin. Pattern extends to very edge of tergites, no lateral tufts. Venter black, with black hairs, first three segments yellowish.

Legs. Coxae and femora yellow, tip of fore femur and apical third of hind femur blackish. Hairs yellow on coxae and most of femora, black on blackish areas and on most of hind femur. Tibiae and tarsi black with black hairs.

Wings. Clear hyaline, with yellow stigma. Anal cell closed on wing margin.

Length. Body 10 mm.; wing 10 mm.

In the British Museum are holotype female and one female paratype from Papua, Kokoda, 1,200 ft., viii.1933 (Cheesman); two female paratypes, 140° E., 3° 10' S., 900-1,800 ft., Jan., 1937-8 (Stüber).

Genus JAPENOIDES, gen. n.

Frons, subcallus, parafacials and face all swollen, bare and shining dark brown. Only antennal sockets, buccae and extreme edge of parafacials along eye margins are tomented. Frons a bulging ridge, diverging towards antennae, with a well-defined, prominent ocellar tubercule, but no ocelli. Antennae: first segment proportionately large, but not inflated nor of markedly unusual shape. Proboscis with fleshy labella occupying about half total length. Wing heavily browned, anal cell closed, with a short stalk, R_4 with short appendix.

One species from the island of Japen, hereby designated as genotype.

JAPENOIDES CHEESMANI, n. sp.

A smallish, slender, dark species, with blackish wings.

♀. *Head.* Frons proportions 7:12:35, index 3, diverging towards antennae. Frons bare, shining dark brown. Subcallus bare, shining, a little lighter in colour than the frons, with brown tomentum around sockets of antennae. Face and parafacials a highly polished mahogany-brown, parafacials with dark brown hairs. Buccae with brown tomentum and dark brown or black hairs. Antennae: first segment black-brown with black hairs, second segment yellow-brown with black hairs, third segment bright orange, terminal segments blackish. Palpi slender, dark-brown, with dark brown hairs.

Thorax. Mesonotum grey-black, scutellum and postalar calli a little reddish, with fine black hairs and numerous silky yellow ones. Pleura grey-black with mainly yellow hairs, a few black ones on mesopleuron.

Abdomen. Dorsum grey-black, more brownish towards apex, segmentations very narrowly paler. Some black hairs, but long, recumbent, silky yellow hairs are prominent on all segments. Lateral margins with a yellow fringe. Venter black-brown, segmentations faintly paler, hairs mainly black, yellow only on segmentations.

Legs. Black or black-brown, with black hairs. Fore tibiae narrowly pale at base, middle and hind tibiae and first tarsal segments brown, black-tipped.

Wings. Brown, more deeply coloured on fore border and along all main veins. Stigma dark brown. Anal cell closed, with short stalk. R_4 with short appendix.

Length. Body 9 mm.; wing 9 mm.

Holotype female and 24 female paratypes from Japen Island, Camp 2, Mt. Eiori, 2,000 ft., x.1931 (Cheesman). I take pleasure in naming this species after Miss L. E. Cheesman, the distinguished explorer, whose fine collections from hitherto inaccessible parts of the New Guinea area are providing so much valuable data about this region.

Genus CYDISTOMYIA.

Cydistomyia Taylor, 1919, PROC. LINN. SOC. N.S.W., 44 (1), p. 47. Genotype: *C. doddi* Taylor, 1919, by original designation (= *T. albithorax* Ric., 1913).

It is usual in classifying the Tabaninae to separate off all the readily-definable units, leaving the miscellaneous residue under the generic name '*Tabanus*'. In the New Guinea fauna, however, the name *Tabanus* is most appropriately applied to the relatively well-defined group with hairy subepaulets. The miscellaneous residue in this fauna has bare subepaulets. As a comprehensive name for this group I have used the name *Cydistomyia*, the genotype of which is a New Guinea species.

It is certain that the species I have included under this name are not a natural group, and will ultimately be distributed into several genera. Some will be referred to Oriental genera, some to Australasian genera, and some, perhaps, be indigenous to New Guinea, but until the genera of these bigger areas are better-defined this cannot be done. The genotype, *C. albithorax* Ric. (*doddi* Tayl.), stands apart from the rest. Ferguson (1926, p. 301) says of it: "Although unlike any other Australian species in general habitus, it conforms well with some extra-limital species, such as *T. sharpei*" (= *insignis* Lw.), "though there are, of course, specific differences". This is not my impression. *T. sharpei*, an African species, has hairy subepaulets, spiracles with a well-defined lip, and a broader face, with the palpi further apart. I do not think there is more than a superficial resemblance.

KEY TO THE NEW GUINEA SPECIES OF CYDISTOMYIA.

1. Abdomen very pointed, showing seven very distinct, tapering segments, the eighth sternite and lamellae protruding freely at tip. A small, dark brown and yellow species *lamellata*, n. sp.
- Abdomen not so constructed 2
2. Frons without a shining callus 3
- Frons with distinct shining callus 5
3. Grey species, without abdominal pattern *caesius* Wlk.
- Yellow-brown species with median triangles 4
4. Pleural hairs mainly white, third antennal segment shorter; palpi more slender *pseudimatura*, n. sp.
- Pleural hairs mainly brown, third antennal segment longer; palpi very short and plump *immatura*, n. sp.
5. Subcallus bare and shining. A strikingly-patterned species, with dull yellow thorax, dark brown abdomen; wings dark brown, with pale tip. Pleura, venter and legs brown *imitans*, n. sp.
- Subcallus covered with tomentum 6
6. A very distinctive species. Mesonotum yellowish grey, with prominent silky yellow hairs all over disc. First four abdominal segments bright orange, with orange hairs; following segments black, with black hairs. Antennae orange, first segment rather long. Palpi orange, very slender. Frons diverging, ocellar tubercle present, callus a swollen, diverging ridge (Text-fig. 55). Wings partly browned, R_4 with long appendix *festiva*, n. sp.
- Without this striking colour and pattern 7
7. Species with a distinct colour-pattern of triangles or bands on abdomen, sometimes on thorax as well 8
- Yellow-brown, yellow or grey species, sometimes dark in part, but without clear-cut abdominal pattern 16
8. Dark brown species, thorax with a conspicuous pair of crescentic pale bands immediately before scutellum. Abdomen with a single median row of separated pale triangles, and with extreme side margins pale on some segments. Body plump, wings long, with half their length beyond tip of abdomen. Ocelli more or less well developed *albithorax* Ric.
- Without conspicuous pale crescents on thorax. Either more elongate or, if rather plump, then wings do not extend very far beyond tip of abdomen 9
9. Thorax as well as abdomen blackish brown, with white transverse bands. No median or lateral triangles on abdomen (♀). Pleura white or greyish, with vertical dark brown band below wing base. First antennal segment rather long, but not cylindrical in side view (Text-fig. 56). Male with first two abdominal segments yellow .. *dimorpha*, n. sp.
- Thorax without these transverse bands 10
10. Middle-sized (15 mm.), grey and black species, abdomen with one median row of very distinct, separated, rounded pale spots; base of second segment also pale. Like *T. semicircularis*. Thorax with pale side margins, and two pale longitudinal stripes. Subcallus dark brown, contrasting with face 11

- Triangles, if present, angular and smaller, much less conspicuous. Species dark brown and yellow in colour 12
11. Larger species (13 mm.). Frons broader, index 3; antennae as in Text-figure 68 *heydoni*, n. sp.
 Smaller species (10 mm.). Frons narrower, index 3½. Antennae as in Text-figure 66 *misimensis*, n. sp.
12. Antennae stouter, third segment and flagellum relatively shorter and broader (Text-fig. 65). Dark brown or black species, scutellum and segmentations white, triangles barely indicated. Anterior tentorial pits deep, circular. Callus elongate spear-shaped *aluensis*, n. sp.
 Antennae slender, third segment relatively longer (Text-figs. 24, 64, 69, 70). Light brownish or blackish species, scutellum somewhat paler. Abdomen with very thin, angular, but distinct triangles. Callus otherwise shaped. Anterior tentorial pits shallow, slit-like 13
13. Wings distinctly darkened along fore border and at apex. Mesonotum rather bare, yellow-brown, with white scutellum, contrasting with darker abdomen, which has distinct median and extreme lateral triangles. Terminal segments of antenna not contrasting in colour with third segment *laetus* de Meij.
 Wings little or not at all darkened. Mesonotum dark brown or blackish, with greenish scaly hairs as well as black hairs; scutellum not contrasting. Abdomen may be rather lighter in colour than thorax, at least basally 14
14. Femora shining dark brown or black, tibiae yellow at base, black apically. Costal cell yellow, anterior border a little browned *nigerrima*, n. sp.
 Femora not so; at most a little greyish 15
15. Smaller species (10 mm.). Callus with a distinct neck between lower portion and linear extension (Text-fig. 64). Terminal antennal segments darker than the third segment *immigrans*, n. sp.
 Larger species (13 mm.). Callus smoothly narrowed into linear extension (Text-fig. 69). Terminal antennal segments not darker than the third segment *inopinata*, n. sp.
16. Frons narrow, index 7 or more, strongly tapering 17
 Frons broader, index 6 or less, parallel, or not strongly tapering 18
17. Frons exceptionally narrow, tapering towards antennae, but narrowest in middle, callus almost linear (Text-fig. 22) [*solomonensis* Ric.]
 Frons tapering evenly towards antennae, not narrowest in middle. Callus strongly expanded at its lower end (Text-fig. 62) *nokensis*, n. sp.
18. A brown species, with bicoloured thorax: scutum divided at transverse suture into a greyish yellow anterior half, and a dark brown posterior half. Pleura divided horizontally, mesopleuron and entire upper half being yellow, sternopleuron and lower half brown *bisecta*, n. sp.
 Thorax not so divided 19
19. Face bare and shining. A deep red-brown species, with dark brown and red-brown hair. Wing uniformly browned; R₁ quite rectangular at base, with moderately long appendix *oudella*, n. sp.
 Face tomentose 20
20. Dark brown or blackish species, with predominantly dark brown hair, thick and bushy on all parts of body, giving the whole insect a blackish appearance. Thorax (greasy) very black, abdomen with entirely black hairs, no reddish or yellowish ones even at sides *crepuscularis*, n. sp.
 Yellow or reddish yellow species; if brown hairs are present, they are not dense enough to obscure ground-colour, and do not give whole insect a blackish appearance. Abdomen with orange or reddish hairs, at any rate at sides 21
21. Larger (13 mm.) species, reddish, with brown or black hairs on palpi and legs, and sometimes on beard. Wings may be stained brown *lorentzi* Ric.
 Smaller (11 mm.) species, yellow, with predominantly yellow hairs, including palpi, beard and legs *sol* S.S.

CYDISTOMYIA ALBITHORAX.

Tabanus albithorax Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 391; Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., pp. 338-341.

Cydistomyia doddi Taylor, 1919, Proc. Linn. Soc. N.S.W., 44 (1), p. 47; Ferguson, 1926, *Bull. ent. Res.*, 16 (4), p. 301.

C. doddi was described from a specimen submitted by Mr. F. P. Dodd and alleged to be from Kuranda, Queensland. In 1940 Mr. Taylor wrote to me that the species had never again been found on the mainland of Australia, and that he had come to the conclusion that there had been an error of locality. Mr. Dodd collected in Papua, as well as in Queensland, and the species might well belong to the New Guinea fauna. Mr. Taylor added that this species, "or something very near it", was well represented in Miss Cheesman's material from Papua.

When the collections came back to me I easily recognized the species in question, and found that Mr. Taylor had labelled one specimen as *C. doddi*. The type of *T. albithorax* Ric. is in the British Museum, and the two are undoubtedly the same species. In the MS. I saw recently Mr. G. H. Hardy stated that the mainland specimens, including the type, were missing, but that the species was represented in the Queensland Museum by New Guinea specimens.

It is remarkable that no author has emphasized the crescentic transverse markings of the thorax, which are such a distinctive feature of this species. It is a short, stoutly-built species, chocolate-brown, the thorax adorned with yellow markings as follows: on the anterior half, two longitudinal stripes and two oblique stripes on the transverse suture, at the sides; on the posterior half a pair of crescentic marks on the hind margin of the scutum, immediately before the scutellum. Abdomen with distinct, isolated, median pale triangles, and extreme lateral angles pale. Wings very long, half their length extending beyond tip of abdomen.

♀. *Head*. Frons proportions 16:18:63, index $3\frac{1}{2}$. The vestiges of three ocelli are present as tiny pale spots, though they do not protrude above the surface. Bare callus as in Text-fig. 20, though the whole frons bulges forwards. Tomentum brown, narrowly white on eye margins. Subcallus, parafacials and face with thick white tomentum and white hairs. Antennae (Text-fig. 20) reddish brown, first two segments with black hairs above and yellow hairs below. Palpi slender pointed, brown with mostly brown hairs, but with long, white, silky hairs on first segment and base of second. Proboscis a little longer than palpi, labella about half total length.

Thorax. Chocolate-brown, more yellowish on anterior half. Humeri orange, notopleural lobes yellow. Yellow bands also on each lateral third of transverse suture, connecting with a pair of longitudinal yellow lines on prescutum. Hind margin of scutum broadly pale yellow, forming a pair of very noticeable crescent-shaped markings. Scutellum entirely chocolate-brown. Pleura orange or yellow in ground-colour, with thick white tomentum. Hairs of thorax black on brown areas, yellow on yellow areas, white on white areas.

Abdomen. Dorsally chocolate-brown, with black hairs. A single median row of very clear-cut yellow median triangles, with yellow hair; that on second segment is largest, equilateral, and not more than half length of tergite, following ones broad but low. Extreme hind-angles yellow, especially on first to third segments. Venter entirely covered in whitish tomentum, with pale yellowish hairs.

Legs. Reddish brown, tarsi and tips of tibiae more blackish. Long hairs of femora white, other hairs of legs black.

Wings. Clear except for yellow-brown stigma. No appendix.

Length. Body 10 mm.; wing 12 mm.

♂. Similar.

In the British Museum: Holotype female, Iwaka R., 1911 (Wollaston); three females, Heuvelbivak, 600 ft., 7-15.xi.09 (Lorentz); paratypes, five females, Papua, Mt. Tafa, 8,500 ft., iii.1934; four females, one male, Mafulu, 4,000 ft., i.1934; six females, Mondo, 5,000 ft., ii.1934; one female, Yule Is., Matsika, iii.1934; one female, W. New Guinea, Mt. Nomo, S. of Mt. Bougainville, 700 ft., ii.1936 (all coll. by Miss Cheesman).

In the Archbold collection: four females, Araucaria Camp, 2,400 ft., 15-22.iii.1939 (Toxopeus); five females, Bernhard Camp, 1,800-2,400 ft., 5.xi.1938 (Olthof); one female same locality, 300 ft., 2.iv.1939 (Toxopeus), three females Lower Mist Camp, 4,400 ft., 30.i-2.ii.1939 (Toxopeus); one female, Sigi Camp, 4,000 ft., 22.ii.1939 (Toxopeus); one female, Rattan Camp, 3,600 ft., 5.iii.1939 (Toxopeus).

In the School of Public Health and Tropical Medicine, Sydney, one female, Hoofd-bivak, 750 ft., Dat. ix (v. Leeuwen). In the S. Australian Museum, one female, N. New Guinea, Mt. Lucreu, 2,000 ft., Jan., 1939 (Cheesman). In the Harvard collection, 1 female, Papua, Morobe Dt., Mt. Misim (Stevens).

This species is easily recognized by its general appearance and pattern, but is very variable in detail, especially in the colour of hairs of head, pleura and legs. Stekhoven (1926) named three varieties based on such differences. In my series from Papua,

Mafulu, the legs are very black and the mesopleuron has a bright yellow tuft like that on the notopleural lobe, but I do not find any consistency, except among specimens collected on the same day, and in the same place.

CYDISTOMYIA LAMELLATA, n. sp.

A small, clearly-patterned, brown and yellow species, quite like *lactus* de Meij. The protrusion of the anal lamellae looks like an artefact due to drying of the specimen, but it is present in all the specimens I have seen. If it represents a real difference of structure it would call for a new genus.

♀. *Head.* Frons proportions 10:10:40, index 4, parallel. Callus short, rounded, with moderate linear extension (Text-fig. 54). Vertex has a large brown triangle with strong black hairs, and a slight ocellar tubercule. Otherwise tomentum of face, subcallus, and entire facial area is yellow (there is a small brown patch just above rostrum, in middle of face). Hairs, including parafacial hairs and beard, dark brown. Antennae (Text-fig. 54): first two segments brown with black hairs, third segment bright orange, following segments black. Palpi brown with dark brown hairs.

Thorax. Mesonotum dark brown, yellowish along longitudinal and transverse sutures, and along sides, and round margin of scutellum. Pleura yellow-brown, a darker patch on sternopleuron, extending on to lower mesopleuron, whitish on some sutures; hairs light brown.

Abdomen. Seven segments are clearly visible, the posterior ones tapering; a narrow ring of the eighth tergite can be seen and beyond this the anal lamellae protrude for a distance at least equal to the breadth of the seventh tergite. Abdomen very pointed in appearance. Dorsum dark brown, first five or six segments with a yellowish white triangle in each hind angle and a yellowish white median triangle. Hairs black on darker areas, pale on pale areas. Venter dark brown with white segmentations, which are continued from the white lateral triangles of the tergites. Eighth sternite protruding by more than the breadth of the seventh sternite.

Legs. Dark brown, with black hairs, forelegs usually more blackish than others.

Wings. Relatively long. Hyaline, but with brown staining along most of main veins, especially marked along costa around wing tip and at tips of radial veins.

Length. Body 9 mm.; wing 10 mm.

In the British Museum are the holotype female and three female paratypes from Japen Is., Camp 2, Mt. Eiori, 2,000 ft., x.1938 (Cheesman); one female paratype, Japen Is., Seroei, Camp 1, Mt. Baduri, Ajam Range, 1,000 ft., 8.ix.1938 (Cheesman).

In the Archbold collection, the following paratypes: two females, Rattan Camp, 3,600 ft., ii.1939 (Toxopens); one female, Mist Camp, 5,500 ft., 9.i.1939 (Toxopens).

CYDISTOMYIA CAESIUS.

Tabanus caesius Walker, 1848, *List. Dipt. Brit. Mus.*, 1, p. 180; Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 419.

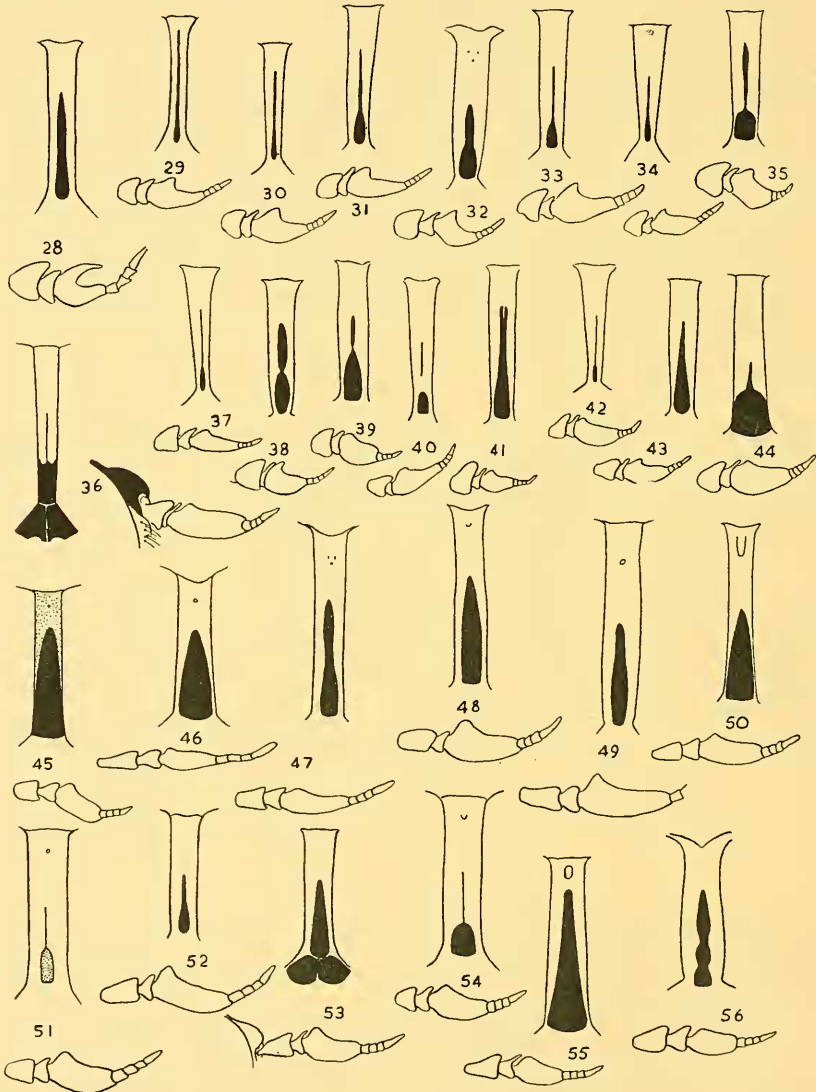
Tabanus leucopterus Wulp, 1868, *Tijdschr. v. Ent.*, 11, p. 98; Ferguson and Hill, 1922, *Proc. Linn. Soc. N.S.W.*, 57 (3), p. 254.

A middle-sized, pale grey species, without abdominal pattern, and with a broad, diverging frons with no frontal callus. Rubbing may produce an irregular bare area on the frons, but the raised ridge which is the basis of a true callus is absent in the type specimen. There is a faint trace of such a swelling, in an inverted heart-shape, in the second specimen in the British Museum.

♀. *Head.* Frons proportions 20:25:60, index 2½. Vertex deeply grooved. No frontal callus. Tomentum of entire head white. Frons almost evenly covered with short, curved, black hairs, each arising from a small black socket. Facial hairs and beard white. Antennae: first two segments yellow with some black hairs, but mainly white hairs. Third segment missing in both the available specimens, but Wulp says it is slightly excavated dorsally. Palpi long and slender, white, with white hairs. Proboscis yellow, labella about one-third of total length.

Thorax. Mesonotum grey, slightly reddish posteriorly, humeri and notopleural lobes yellowish. Clothed with fine black hairs and silky white ones. Pleura grey, with white hairs.

Abdomen. Dorsum grey with pale segmentations. Hairs are mingled black and white, with more pale hairs on segmentations, becoming longer towards rear. Venter similar, with entirely pale hairs.



Text-figures 28-56.

Figs. 28-56. Frons and antenna of female: 28, *T. denticulatus* Ric.; 29, *T. flavipennis* Ric.; 30, *T. cinnamoneus* Dol.; 31, *T. recusans* Wlk.; 32, *T. flammeus* S.S.; 33, *T. stuberi*, n. sp.; 34, *T. opalescens* S.S.; 35, *T. lenticulatus*, n. sp.; 36, *T. ceylonicus* Schin.; 37, *T. vanleeuweni*, n. sp.; 38, *T. productus*, n. sp.; 39, *T. truncatus*, n. sp.; 40, *T. patriarchus*, n. sp.; 41, *T. infuscatus*, n. sp.; 42, *T. approximatus*, n. sp.; 43, *T. daruensis*, n. sp.; 44, *T. angustilineatus*, n. sp.; 45, *Ch. ochrothorax* S.S.; 46, *Ch. basifasciata* de Meij.; 47, *Ch. parva*, n. sp.; 48, *Ch. raffrayi* Big. (modern specimens); 49, *Ch. brevisculus* Wlk.; 50, *Ch. subhastata*, n. sp.; 51, *Ch. parvicallosa*, n. sp.; 52, *Ch. fasciata*, n. sp.; 53, *Cyd. imitans*, n. sp.; 54, *Cyd. lamellata*, n. sp.; 55, *Cyd. festiva*, n. sp.; 56, *Cyd. dimorpha*, n. sp.

Legs. Yellow, femora a little greyish. Hairs pale on femora and underside of tibiae, black elsewhere.

Wings. Clear hyaline, without any colouring and with hardly a distinct stigma; veins yellow. R_1 with long appendix.

Length. Body 12 mm.; wing 11 mm.

Walker's type is from an unknown locality ("bought at Mr. Children's Sale"), but is clearly conspecific with a second specimen in the British Museum from New Guinea, 1901 (Kühn). Wulp's type is in the Rijksmuseum of Natural History, Leyden, and was collected in the Aroe Is. by Rosenberg. The species also occurs in the Northern Territory of Australia.

The appearance of this species is typically that of a sand-living form. Ferguson and Hill (1922) say: ". . . it is found on or near the sea-coast, but on several occasions it has been taken attacking the occupants of boats several miles out to sea."

This species is clearly different from the rest. Under Mr. Hardy's new classification of the Australian Tabaninae it comes in the *vetustus* group of *Dolichapha*.

CYDISTOMYIA IMMATURA, n. sp.

This species is not very closely allied to *caesi* Wik., but is included in the same couplet for convenience, because of the lack of a distinct callus. It seems to resemble *erythrocephalus* Wulp, but differs in the more slender antennae, the much broader, shorter palpi, and the coloration of the head. It is a middle-sized, yellow and black species, all specimens of which look immature, whether they are or not.

♀. *Head.* Frons proportions 17:17:57, index $3\frac{1}{2}$, parallel. Frons brown, overlaid with yellow-brown tomentum. There may be a raised ridge (dotted line, Text-fig. 59), but this is not denuded into a shining callus in the specimens I have seen. Hairs, fine, black, rather longer at vertex. Subcallus and facial area reddish brown. Hairs, including anterior part of beard, dark brown, middle and hind areas of beard may be white. Antennae rather elongate and slender (Text-fig. 59): first two segments brown with black hairs, rest of antennae more orange. Palpi short, curved and stumpy, brown with dark brown hairs.

Thorax. Mesonotum yellow-brown, darkest towards anterior, with sutures and posterior median area of scutum paler. Hairs rather long, fine, black, intermingled with silky yellow ones; yellowish tufts on postalar calli. Pleura brown, paler anteriorly and posteriorly; hairs dark brown, paler on propleuron, pteropleuron and metapleuron.

Abdomen. Dorsum yellow-brown, with dark brown hairs. Whitish along hind margins of segments, on extreme side margins, and in a row of shallow median triangles. These areas have yellowish hairs, longer lateral pale fringes on second to fifth segments inclusive. Venter dark brown with brown hairs, segmentations yellowish with yellow hairs.

Legs. Dark yellow-brown with black hairs.

Wings. Faintly tinted with brown, especially over cross veins and along R_{2+3} and R_4 . The subcostal cell is yellow. Appendix absent or faintly indicated.

Length. Body 13 mm.; wing 13 mm.

In the British Museum is the holotype female from Cyclops Mts., Mt. Lina, 3,500 ft., iii.1936 (Cheesman). In the Archbold collection: paratype female, Rattan Camp, 3,600 ft., 17.ii.1939 (Toxopeus); one female, one male, Moss Forest Camp, 8,400 ft., 14.x.1938 (Toxopeus). In the Harvard collection, one female paratype, Morobe Dt., Surprise Creek, 26.x.19? (Stevens). In the U.S. National Museum is one female paratype from Cyclops Mts., 1,000 ft., Apr., 1945 (Jean Laffon).

CYDISTOMYIA PSEUDIMMATURA, n. sp.

Very close to *immatura*, with which I at first confused it. The most noticeable differences are in the hairs of the pleura and in the antennae, and in the female palpi.

♀. *Head.* Frons proportions 17:17:57, index $3\frac{1}{2}$, parallel, i.e. exactly the same as in *immatura*. Third antennal segment relatively shorter and broader (Text-fig. 60).

Facial area paler, contrasting with brown subcallus, and parafacials relatively broader (cf. Text-figs. 59, 60). Palpi still short, but relatively slender. Beard snow-white.

Thorax. Mesonotum (♀) with recumbent yellow hairs entirely absent. Pleural hairs almost entirely snow-white.

Abdomen. Median pale triangles almost non-existent.

Legs. Much lighter, reddish yellow, with many long pale hairs on femora.

Wings. In female holotype are paler, not marked as in *immatura*.

Length. Body 15 mm.; wing 15 mm.

♂. Eight males are available and agree in main features with the characters of the females, especially the structural differences and the colour of the pleural hairs. They show some variation in body and wing colour.

In the Archbold collection: holotype female, eight male paratypes from Iebele Camp, 6,750 ft., xi.1938 (Toxopeus); one male paratype, Moss Forest Camp, 24.x.1938 (5 Km. N. of Habbema Lake) (Toxopeus).

CYDISTOMYIA IMITANS, n. sp.

The characters given in the key distinguish this species from any in New Guinea.

♀. *Head.* Frons proportions 15:15:63, parallel, index 4. Callus short, flask-shaped, shining yellow anteriorly, becoming darker behind. Tomentum of frons golden yellow, with long dark brown hairs. A bare ocellar tubercle is present, but is not greatly swollen. Subcallus prominent and entirely bare, shining yellow. Parafacials and buccae with golden tomentum and dark brown hairs, face slightly more brown. Antennae (Text-fig. 53): first two antennal segments brown, with black hairs; rest bright orange. Palpi moderately slender, dark brown, with dark brown hairs.

Thorax. Mesonotum blackish, covered with golden yellow tomentum, which is much thicker on notopleural lobes, making these bright golden in appearance. Fine black hairs and abundant silky golden ones. Pleura in marked contrast with mesonotum, being dark brown with dark brown hairs. A little rusty-brown tomentum on sternopleuron and a few yellow hairs on prothorax.

Abdomen. Dorsum dark brown, a little paler on basal segments, venter dark brown, both with black hairs. The only yellow hairs on the abdomen are in a tiny median triangle on the first segment.

Legs. Very dark brown, almost black, knees narrowly reddish. Hairs black.

Wings. Very dark brown, slightly paler in some cells, and with a pale strip starting from vein R_4 —where it occupies half the width of cell R_4 —narrowing along wing margin almost to nothing in fifth posterior cell, then expanding again to fill the axillary area and most of anal cell.

Length. Body 12 mm.; wing 11 mm.

Holotype female, two female and three male paratypes from Araucaria Camp, 2,500 ft., 25.iii.1939 (Toxopeus), are in the Archbold collection. The holotype will be deposited in the Buitenzorg Museum, Java.

The only species known to me which resembles this is one common in collections from New Caledonia, but which appears to be undescribed. I understand that Dr. J. Bequaert is to describe this latter as new in his forthcoming paper on the Tabanidae of the Pacific Islands. In order not to prejudice his description I will say no more than that the two species are abundantly distinct, perhaps not even closely related, yet show remarkable agreement in the general pattern of coloration. This suggests that they may both mimic some other insect, probably a Hymenopteron, the mimetic resemblance having developed independently in the two areas. There are some bees of the genus *Megachile* that have this general appearance, but I have not been able to find an exact model.

CYDISTOMYIA FESTIVA, n. sp.

A strongly-marked, orange and black species, the abdomen bright orange on four basal segments, rest black. Wings darkened, appendix present. In general appearance

this closely resembles *chryساتer* S.S., from Java, but differs from that species in having the subcallus and facial area yellow instead of chocolate-brown; beard yellow instead of black; thorax without pale longitudinal stripes; wings with long appendix.

♀. *Head.* Frons proportions 8:12:44, index 4, strongly diverging towards antennae. Callus prominent, a tapering ridge (Text-fig. 55). Well-marked ocellar tubercle present. Tomentum of frons yellow, with black hair. Subcallus and entire facial region with thick yellow tomentum; hairs mainly black on parafacials, hairs of face mixed black and yellow, beard yellow. Antennae (Text-fig. 55): first segment rather long, third segment almost equal to the terminal segments; first two segments light brown, with black hairs externally and orange hairs dorsally and ventrally; rest bright orange, only the extreme tip slightly browned. Palpi very slender, orange; hairs rather long and drooping, mainly orange basally, mainly black towards apex of palpi. In dried specimens the eyes may still retain a vivid green colour and show one broad purple band from the antennal angle of the eye.

Thorax. Mesonotum uniformly covered with thick greenish yellow tomentum, with a few fine black hairs, but silky yellow hairs are especially numerous posteriorly, and all side tufts almost entirely yellow. Pleura mainly with yellow tomentum and yellow hairs, but with brown tomentum and dark brown hairs on ptero- and hypopleura and on coxae. The metapleura and its tuft, however, are yellow.

Abdomen. First four segments bright orange, with orange hairs, the first tergite with some black hairs. Fifth to seventh sternites black, with black hairs, but anal lamellae appear to be orange. Venter similar.

Legs. Coxae and femora dark brown, tibiae somewhat lighter, tarsi dark, all with black hairs.

Length. Body 10 mm.; wing 10 mm. (One specimen is much smaller than the others, about 8 mm. long.)

In the British Museum are the holotype and four female paratypes from Japen Is., Camp 2, Mt. Eiori, 2,000 ft., x.1938 (Cheesman).

CYDISTOMYIA DIMORPHA, n. sp.

A small species (8 mm.) showing marked sexual dimorphism. The female is black, with transverse white bands on both thorax and abdomen; the male has a similar thorax, but the first two abdominal segments are pale yellow, contrasting with the following segments. In this the males resemble *basalis* Mcq., but are distinguished at once by the grey transverse bands on the thorax.

♀. *Head.* Frons proportions 8:10:35, index 3½. Callus as in Text-fig. 56, without very great anterior expansion. Tomentum grey, black about region of ocellar callus, which is very faintly indicated. Subcallus with dark brown tomentum, contrasting sharply with grey of parafacials, buccae and face; there is brown tomentum about bases of proboscis and palpi, extending across to each eye margin. Hairs white, except on brown area, where they are dark brown. Beard unusually sparse. Antennae (Text-fig. 56): first antennal segment rather long, third of unusual shape, resembling that of *Haematopota*. Rather blackish brown, with black hairs, and some pale hairs ventrally on first two segments. Palpi elongate, blackish, with white hairs at base, otherwise with mainly black hairs.

Thorax. Mesonotum and pleura dark nigger-brown, with two white or greyish transverse bands which cross the mesonotum and extend down the pleura on each side. One band lies on the transverse suture and includes the notopleural lobes, and the anterior pleura up to the middle of the mesonotum; the other comes immediately before the scutellum, passing behind the wing base and including the metapleuron. Scutellum dark nigger-brown.

Abdomen. Dorsally and ventrally dark nigger-brown, with dark brown hairs, hind margin of each segment with a clear-cut narrow white band, not at all raised into median triangles, and with white hairs. Seventh tergite mainly white.

Legs. Dark brown, with dark brown hairs.

Wings. Faintly tinted brownish, more strongly so along costal margin and at tips of radial veins. Vein R_4 without appendix.

Length. Body 8 mm.; wing 8 mm.

♂. Differs from female in following particulars: no brown patch on each parafacial; whole of second abdominal segment and parts of first and third are translucent yellow, both dorsally and ventrally.

Holotype female and two male paratypes from Araucaria Camp, 2,500 ft., iii.1939 (Toxopeus) are in the Archbold collection.

In the British Museum is one male paratype from Japen Is., Mt. Eiori, 2,000 ft., xi.1938 (Cheesman).

The position of this species is somewhat anomalous. In venation as well as in general appearance it may be allied to *Chasmia basifasciata* de Meij., but the antennal structure is different.

CYDISTOMYIA LAETUS.

Tabanus laetus de Meijere, 1906, *Nova Guinea*, v, p. 74; Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 391; Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 334.

A smallish (10 mm.) dark brown species, with white scutellum, prominent median and lateral abdominal triangles, and a strong brown stain along costal margin of wing.

♀. *Head.* Frons proportions 10:10:47, index 5, parallel. Callus with small anterior portion, and spindle-shaped median extension (Text-fig. 24). Tomentum of frons grey, brown near callus. Subcallus golden brown; face light brown in middle, white at sides; parafacials and buccae white, with white hairs and beard. Antennae (Text-fig. 24): reddish, basal segments with black hairs, fourth to seventh segments slightly darker. Palpi bulbous basally, tapering to a long, fine point, dark brown with black hairs.

Thorax. Mesonotum chestnut-brown, with black hairs, fading to white with white hairs on all borders, including anterior border of scutum, and whole of scutellum; notopleural area is left dark brown. Pleura mainly white, with white hairs, sternopleuron brownish. Fore coxae rather brownish, with some pale brown hairs, other coxae white with white hairs.

Abdomen. Dorsum dark brown with brown hairs, each segment with a large and clearly-defined white median triangle with white hairs, and a similar pair of lateral triangles. Venter dark brown, with white segmentations.

Legs. Femora chestnut brown, tibiae more yellowish, tip of fore tibiae and all tarsi black-brown, hairs black.

Wings. Slightly stained yellow, and deeply browned along fore border up to vein R_4 , and round costa as far as vein M_2 . No appendix.

Length. Body 10 mm.; wing 10 mm.

The holotype (female) of this species, from "New Guinea", is in *Natura Artis Magistra*, Leyden, with females from Etna Bay, the Lorentz area and Vertseeg's area. In the British Museum are two paratypes from Heuvelbivak (Lorentz), and two females from Papua, Mafulu, 4,000 ft., xii.1933 (Cheesman). In the School of Public Health and Tropical Medicine, Sydney, are two females from Papua, Mondo, 4,750 ft. (Stewart), and two females, Finsch Haven (Wagner). Stekhoven also records it from the Bougainville Mts.

CYDISTOMYIA ALUENSIS, n. sp.

A middle-sized black species, slender in build, with white scutellum and white abdominal segmentations, very slightly raised into median triangles. Wings darker along fore border, antennae and legs black. Differs from *albidosegmentatus* S.S. in having black palpi and legs, and brown-stained wings.

♀. *Head.* Frons proportions 15:13:60, index 4, very slightly tapering. Callus as in Text-fig. 65, tomentum greyish, with black hairs. Subcallus with dark brown tomentum, contrasting strongly with white parafacials. Centre of face slightly brownish, otherwise entire facial area white with white hairs; beard white. Anterior tentorial pits are

unusually deep, and almost circular. Antennae (Text-fig. 65); black with black hairs, only extreme base of third segment reddish. Palpi black, with black hairs.

Thorax. Tomentum of mesonotum; anterior half, back to transverse suture and a little beyond it in middle, ashy grey, with three narrow brown longitudinal stripes; posterior half of scutum dark reddish brown; lateral margins and scutellum white or whitish; notopleural lobes brown. Dark areas with black hairs, pale areas with white ones. Pleura greyish, more brownish on parts of mesopleuron and sternopleuron, hairs snow-white.

Abdomen. Dark brown. Extreme lateral margins of first tergite and hind margins of second, third and fourth segments are white, the white segmentations being slightly expanded laterally and medially. Venter similar, without marked expansions of segmentations, fifth and sixth segments all dark brown.

Legs. Coxae with many brown hairs. Legs black or very dark brown, knees pale, hairs black.

Wings. Stained yellow-brown, more deeply so on foreborder and radial veins. Small trace of appendix.

Length. Body 12 mm.; wing 11 mm.

Holotype female, 15 female paratypes, from mountain slope above Bernhard Camp, 2,100 ft., 16.iii-10.iv.1939 (Toxopeus); other paratypes; one female, Bernhard Camp, hills near Alu Camp, 1,800-2,400 ft., 5.xi.1938 (Olthof); two females Araucaria Camp, 2,400 ft., 21-23.iii.1939 (Toxopeus); one female Rattan Camp, 3,600 ft., 24.iii.1939 (Toxopeus). All the above in the Archbold Collection, type to be deposited in the Buitenzorg Museum Java.

Miss Cheesman collected three females on Waigeu, Camp Nok, 2,500 ft., iv.1938, and W. Stüber one female at 140°E, 3°10'S, Jan., 1937-8, 900-1800 ft. These specimens may represent a variety of this species. They are rather smaller and slighter in build, flagellum of antennae narrower, beard brown instead of white. They are not in good condition.

CYDISTOMYIA NIGERRIMA, n. sp.

Very similar to *immigrans*, but blacker in appearance, femora all dark, costal cell yellowed. It is possible that this is only a dark form of *immigrans*, but the two occur in the same area.

♀. *Head.* Frons proportions 11:13:56, index $4\frac{1}{2}$, slightly divergent. Tomentum of frons grey at sides, brown in middle. Callus with prominent lower part and stout median extension (Text-fig. 70). Subcallus with thick dark brown tomentum. Rest of facial area contrasting, white, with white hairs, including beard. Antennae (Text-fig. 70): first two segments brown, with black hairs; third segment orange; terminal segments blackish, together fully as long as third segment. Palpi black with black hairs, except for white hairs on basal segment.

Thorax. Mesonotum as in *immigrans*, chestnut brown, with grey tomentum at sides and on sutures, greenish grey when seen from behind, with fine black hairs and silky greenish ones. Notopleural lobe more strikingly dark, so that a very distinct blackish band runs along notopleural suture. Pleura grey, with white hairs.

Abdomen. Dark brown with white segmentations and black hairs, a little reddish towards base. White hairs along segmentations, with indications of shallow median and lateral triangles. Venter similar, some greyish tomentum on first two segments, extending up into a tomentose spot on each side of first tergite.

Legs. All femora shining dark brown or black. Fore tibiae yellow on basal two-thirds, apical third and tarsi black; middle and hind tibiae, and first tarsal segments yellow, rest of tarsi black. Hairs black.

Wings. Almost hyaline, except that costal cell and anterior half of first basal cell are clear yellow, and costal margin is slightly browned between stigma and apex of wing. R, with only a trace of an appendix.

Length. Body 9 mm.; wing 11 mm.

Holotype female from Milne Bay, Feb., 1943 (Mackerras) is in the collection sent to me by Mr. D. J. Lee. In the U.S. National Museum are two paratypes, one female Maffin Bay, 20 Oct., 1944; one female Nadzab, Markham R. Valley, July, 1944 (Krombein). In the School of Public Health and Tropical Medicine, Sydney, is a specimen from Fly R. (Strong) which appears to belong to this species, though the abdomen (denuded) is more reddish and more elongate.

CYDISTOMYIA IMMIGRANS, n. sp.

Closely allied to *T. sequens* Wlk., from Queensland, but I think it is distinct. The mesonotum lacks the underlying grey colour of *sequens* and other allied species, the frons is narrower, and the antennae rather different.

♀. *Head.* Frons proportions 11:11:48, index $4\frac{1}{2}$, parallel. Tomentum of frons yellow, with dark brown hairs. Subcallus golden brown, contrasting with entire facial area, which is white with white hairs. Antennae (Text-fig. 64): first two segments brown with black hairs; third segment redder, following segments black. Palpi yellow or blackish, first segment with white hairs, second with mainly black hairs.

Thorax. Mesonotum light chestnut, with paler tomentum on sutures and margins; a greenish appearance when seen from behind. Scutellum more reddish in ground-colour. In well-preserved specimens there are a pair of triangular, whitish tomentose spots immediately before scutellum. Fine clothing hairs are black, intermingled with some silky greenish ones, and with paler hairs more numerous at sides and posteriorly. Pleura white, with white hairs, rather long and thick on pro- and metapleura.

Abdomen. Dorsum yellow-brown basally, darker apically, with segmentations narrowly white. Median pale triangles merge into an indistinct stripe; extreme lateral margins of segments are white, forming a white stripe along each side of dorsum. Hairs brown on most of brown area, and overlapping a little into brown areas. Venter greyish, with mostly white hairs.

Legs. Mainly reddish yellow, tips of tibiae and tarsi blackish. Some grey dusting on femora, especially on basal third of hind femora. On some specimens the entire foreleg may be more blackish. Some whitish hairs on femora, and yellowish ones on tibiae, otherwise hairs mainly black.

Wings. Clear hyaline, except for a narrow browning along costa, most marked at tips of radial veins. Stigma pale yellow. No appendix. Costal cell hyaline.

Length. Body 10 mm.; wing 9 mm.

In the British Museum are the holotype female and two female paratypes from Papua, Kokoda, 1,200 ft., ix-x.1933 (Cheesman); one female Huon Gulf, Morobe Dt., 22.v-19.vi.1937 (Froggatt). In the School of Public Health and Tropical Medicine, Sydney, six females, N.E. Papua, Mt. Lamington, 1,300-1,500 ft. (McNamara); one female Madang (Lohe); one female Buldo, 2,200 ft. (Taylor); one female Buna Bay (McNamara); one female Papua, Goodenough Is. (Clinton); two females Lae, 1947 (Bayley). In the U.S. National Museum are two females from Cyclops Mts., 1,000 ft., Feb. and Apr., 1945 (Jean Laffon), which seem to belong to this species, though the legs are somewhat darker.

CYDISTOMYIA INOPINATA, n. sp.

Nearly related to *immigrans*, from which it differs in being slightly longer and more robust, in having a different callus, and in the terminal antennal segments not being darkened.

♀. *Head.* Frons proportions 12:12:56, index $4\frac{1}{2}$, parallel. Tomentum of frons greyish yellow, with yellow hairs. Callus (Text-fig. 69) pale yellow. Subcallus with golden brown tomentum, contrasting with the white tomentum and white hairs of facial area. Beard white. Antennae (Text-fig. 69): first two segments yellow-brown, with black hairs; third segment bright orange; other segments slightly darker, but not black. Palpi whitish, hairs white on first segment, otherwise mainly black.

Thorax. Mesonotum reddish yellow, overlaid with greyish tomentum, especially thick anteriorly and just before scutellum, clothed with fine black hairs and recumbent silky yellow ones. Pleura with thick whitish tomentum and white hairs.

Abdomen. Dorsum yellow-brown, obscurely darker apically, hind margins of segments whitish. Hairs mainly black; whitish hairs in large median triangles and on hind margins, especially towards sides. Venter similar, but without median triangles, and with more numerous whitish hairs on disc.

Legs. Yellow-brown, femora with a little grey dusting, tarsi darker. Hairs largely black on dorsal face, and on tarsi, some whitish hairs ventrally.

Wings. Hyaline, only stigma clear yellow, or slightly tinted along veins. R_4 with very short appendix, or a mere trace.

Length. Body 13 mm.; wing 12 mm.

Female holotype and one female paratype, Morobe Dt., Surprise Creek (Stevens), are in the Harvard Museum of Comparative Zoology.

CYDISTOMYIA HEYDONI, n. sp.

Superficially very like *T. semicircularis* Ric. and *T. exagens* Wlk. The general pattern is so similar that at first sight it would seem that any system that separates this species from the *semicircularis* group must be an artificial one. Yet it has a bare subepaulet, thoracic spiracles without lips, and a broader, more parallel-sided frons. I think there is no doubt that *heydoni* belongs to *Cydistomyia* as I am using the term, and that the resemblance to *semicircularis* is convergent. This is confirmed by other minor details such as the entirely different pattern and hair-covering of the mesonotum.

I have pleasure in naming this species after Dr. G. A. M. Heydon, who collected some of the type material, and who very kindly communicated my earlier paper to the Linnean Society of New South Wales.

♀. *Head.* Frons proportions 19:19:52, index 2½, parallel. Callus very short, with short linear extension, the whole centre of frons distinctly bulbous (Text-fig. 68). Tomentum of frons white immediately above callus, and narrowly along eye margins, almost to vertex, but dark brown with black hairs on most of upper two-thirds of frons. Subcallus dark brown tomented, strongly contrasting with entire facial area, which is white with snow-white hairs. Antennae (Text-fig. 68): black with black hairs. Palpi somewhat variable in shape and colour, whitish internally, with greyish or grey tomentum externally, and white or black hairs.

Thorax. Mesonotum boldly marked in dark brown and grey. Brown markings are: a broad median stripe, tapering sharply in its hinder half to about one-quarter of its former width, then reaching scutellum, where it expands again to occupy half width of scutellum. On each side of this median stripe is a broad lateral stripe, narrowly interrupted at transverse suture, which leaves bare the entire lateral border, including notopleural lobes. Between these stripes tomentum is grey. Two kinds of clothing hairs, longer and silky, shorter and stiff. Both these are black on the brown areas, white on pale areas. Pleura with greyish tomentum and entirely silvery hairs.

Abdomen. Dorsum mainly dark brown, with a pattern similar to that of *exagens* Wlk.: i.e., first segment is indistinctly whitish in middle; second segment has a pair of crescentic transverse marks anteriorly and a shallow median triangle behind; four following segments have pale median triangles of diminishing size; each segment with lateral triangles, which unite into a pale band along side margins. Venter mainly dark brown with very narrow pale segmentations expanding into small lateral triangles. Hairs black on dark areas, white on pale areas.

Legs. Forelegs black with black hairs, except for tibiae, which are reddish, with pale hairs on basal half. Middle and hind legs reddish, femora a little darkened dorsally, tarsi and tips of tibiae blackish. Hairs dark on dark areas, white or whitish elsewhere, especially on femora.

Wings. Quite clear, without any brown colouring. R_4 with a very short appendix, or with merely an indication of one.

Length. Body 11–13 mm.; wing 11 mm.

♂. Closely similar, and can be named from key.

In the British Museum is the holotype female, Upper Ramu R. (Bearup). Paratypes: in the School of Public Health and Tropical Medicine, Sydney, four females, Ai-ura,

Upper Ramu R. (Heydon); one female Upper Ramu R. (Heydon). In the Archbold Collection one female, Balien Camp, 5,000 ft., 9.xii.1938 (Toxopeus); one female Iebele Camp, 7,000 ft., 5.xi.1938 (Toxopeus); one female Moss Forest Camp, 28.x.1938 (9 km. N. from Habbema Lake) (Toxopeus).

CYDISTOMYIA MISIMENSIS, n. sp.

This species is represented by three very poorly preserved females in the Harvard Museum of Comparative Zoology. Because of the state of the specimens it is scarcely possible to give any detailed description, but as the species is clearly related to *heydoni*, yet abundantly distinct, it is possible to give a few diagnostic characters. It differs from *heydoni* in the following details.

♀. *Head*. Frons slightly narrower, proportions about 13:13:46, index $3\frac{1}{2}$. Antennae black, but third segment relatively more slender, and following segments relatively shorter (cf. Text-figs. 66, 68).

Thorax. Mesonotum much denuded, but seems to lack the distinctive pattern of *heydoni*, and may be almost uniformly greyish.

Abdomen. Pattern of dorsum similar, but the hind margins of the segments are pale, whereas in *heydoni* the triangles are quite isolated.

Legs and wings generally agree with the description given for *heydoni*.

Length. Body 9–10 mm.; wing 9 mm.; much less robust than *heydoni*. In the Harvard Museum of Comparative Zoology, three co-type females, Morobe Dt., Mt. Misim (Stevens).

CYDISTOMYIA BISECTA, n. sp.

Represented by a unique specimen, this species is set apart from any other in New Guinea, except *T. latisegmentatus* S.S., by the peculiar patterning of the thorax. From *latisegmentatus* it differs in numerous details of colour.

♀. *Head*. Frons proportions 13:13:65, index 5, parallel. Callus mahogany-brown, an elongate spear-shape, almost completely filling frons at its lower end (Text-fig. 63). Tomentum of frons very narrowly yellow along lower eye margin, elsewhere dark brown with black hairs. An indistinct ocellar triangle and three vestigial ocelli can be seen. Subcallus with golden brown tomentum, face centrally dark brown, rest of face, parafacials and buccae bright lemon-yellow. Hairs dark brown on face and parafacials, elsewhere yellow. Antennae (Text-fig. 63): bright orange, two basal segments with black hairs. Palpi blackish brown with black hairs.

Thorax. Mesonotum dark brown with black hairs, overlaid anteriorly—i.e. before transverse suture—with greyish yellow tomentum and pale hairs. Humeri and notopleural lobes yellow, with long yellow hairs; supra-alar and postalar calli brown, with black hairs. Pleura divided horizontally into an upper bright yellow area with yellow hairs and a lower dark brown area with black hairs. Dividing line is the horizontal suture dividing mesopleuron from sternopleuron.

Abdomen.—Dark brown with black hairs, without any paler hairs or pattern, except at sides of extreme base, where there is a lemon-yellow patch with yellow hairs.

Legs. Dark brown, with black hairs.

Wings. Slightly tinted yellow all over, much more darkly stained in costal and basal cells. Darkening in basal cells extends over cross-veins and joins up with stigma, giving a suggestion of a cross-band.

Length. Body 11 mm.; wing 10 mm.

The unique female holotype, from Bernhard Camp, 1,800–2,000 ft., 5.xi.1938 (Olthof), is in the Buitenzorg Museum, Java.

CYDISTOMYIA NOKENSIS, n. sp.

Allied to *solomonensis* Ric., but distinguished from that species by the slightly broader frons, which is narrowest at antennae, and by the callus, which is more expanded at its lower end (cf. Text-figs. 22, 62). Closely resembles description of *olivaceus* S.S., but differs in longer third antennal segment and in entirely clear apex of wing.

♀. *Head.* Frons proportions 12:8:63, index 8, tapering. Callus shaped as in Text-fig. 62, pale yellow. Subcallus and entire facial area pale yellow, with yellow hairs, except for dark brown hairs on parafacials and buccae. Antennae (Text-fig. 62): pale reddish yellow, basal segments with a few orange hairs, but mostly with black hairs. Palpi yellow, with mostly yellow hairs. Proboscis yellow, labella about half total length.

Thorax. Mesonotum yellow-brown with black hairs, a few yellow hairs on lateral calli. Pleura yellow with yellow hairs.

Abdomen. Dorsally and ventrally yellow-brown on first two segments, or thereabouts, becoming black-brown apically; hairs black. No pale triangles.

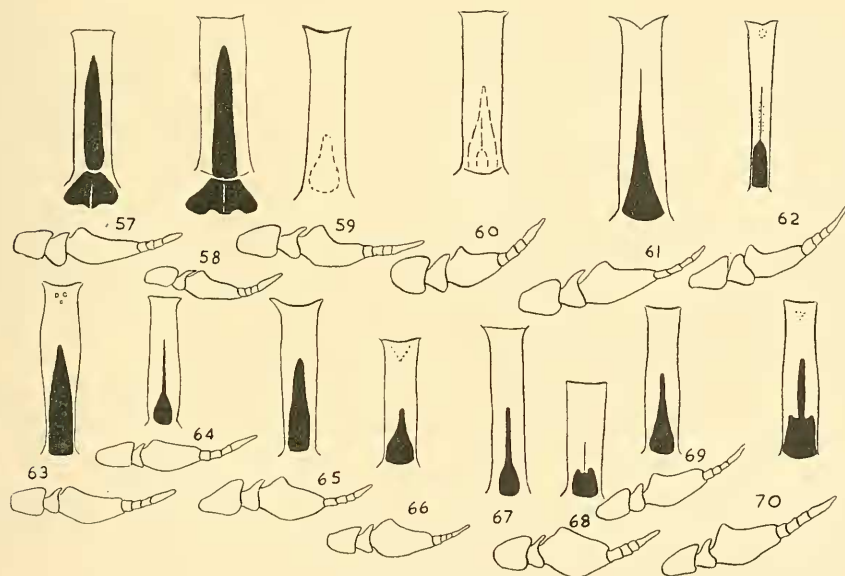
Legs. Femora reddish yellow, with mainly red hairs; tibiae and tarsi darker, with black hairs.

Wings. Clear, only yellowed in costal and first basal cells. R_4 without appendix.

Length. Body 12 mm.; wing 11 mm.

♂. Similar, hairs of mesonotum longer. This is one of the species of which the male can really only be named by association with the females.

Female holotype, one female, one male paratypes, Waigeu, Camp Nok, 2,500 ft., iv.1938 (Cheesman), in the British Museum. In the U.S. National Museum, one female paratype from Hollandia, May, 1945 (Malkin).



Text-figures 57-70.

Figs. 57-70. Frons and antennae of female: 57, *Chalybosoma luciliaeformis*, n. sp.; 58, *Chal. malkini*, n. sp.; 59, *Cyd. immatura*, n. sp.; 60, *Cyd. pseudimmatura*, n. sp.; 61, *Cyd. oudella*, n. sp.; 62, *Cyd. nokensis*, n. sp.; 63, *Cyd. bisecta*, n. sp.; 64, *Cyd. immigrans*, n. sp.; 65, *Cyd. aluensis*, n. sp.; 66, *Cyd. misimensis*, n. sp.; 67, *Cyd. crepuscularis*, n. sp.; 68, *Cyd. heydoni*, n. sp.; 69, *Cyd. inopinata*, n. sp.; 70, *Cyd. nigerrima*, n. sp.

CYDISTOMYIA OUDELLA, n. sp.

Although the unique female of this species was somewhat damaged during its original pinning, the characters given in the key enable it to be recognized as distinct.

♀. *Head.* Frons proportions 9:13:50, index 4, frons diverging towards antennae, with slightly concave sides (Text-fig. 61). Callus an elongate pyramid with concave sides. Tomentum of frons brownish yellow, with black hairs. Subcallus, parafacials

and buccae with golden-brown tomentum and brown hairs, which become black in beard. Face largely brown, shining yellow-brown. Antennae (Text-fig. 61): first two segments yellow-brown with black hairs; third segment dark red-brown basally, yellow apically above, following segments dark red-brown. Palpi yellow-brown, with black hairs, rather long.

Thorax. Mesonotum light brown, with abundant silky yellow-brown hairs; the fine erect hairs are mainly black or brown, but with many yellow ones, especially on the sides and hind margin. Pleura yellow-brown with yellow hairs.

Abdomen. Dorsally and ventrally reddish brown with orange hairs, disc of each segment rather darker, hind margin rather lighter.

Legs. Yellowish with orange and yellow hairs on femora and bases of tibiae, black hairs on tarsi and tip of fore tibiae giving these areas a darker appearance.

Wings. Yellowed as far back as vein Cu_1 , colour becoming deeper towards fore border. Base of R_4 quite rectangular and with moderately long appendix.

Length. Body 11 mm.; wing 12 mm.

In the British Museum is the holotype female, a unique specimen from Japen Is., Camp 3, Central Range, Mt. Oud, 3,500 ft. (Cheesman).

CYDISTOMYIA SOL.

Tabanus sol Schuurmans Stekhoven, 1926, *Treubia*, vi, suppl., p. 450.

A species recognized by the predominantly pale yellow colour of the tomentum and hairs in almost every part. The holotype was originally named *insurgens* by Miss Ricardo, and I think Stekhoven was right in removing it from that species because of the broader third antennal segment. I am not certain that the specimens listed below all belong to one species, since there is variation in antennal shape, wing colour and venation, but I am not prepared to split the material further. The description below is taken from Stekhoven's type in the British Museum.

♀. *Head.* Frons proportions 11:10:50, index 5, nearly parallel. Callus (Text-fig. 21) pale yellow, somewhat abraded. Tomentum of frons, subcallus and entire facial area bright yellow; some black hairs towards vertex, hairs otherwise entirely yellow. Antennae (Text-fig. 21): entirely yellow, with yellow hairs, only those on terminal segments brownish. Palpi yellow, with yellow hairs.

Thorax. Mesonotum and pleura entirely yellow, with yellow hairs.

Abdomen. Dorsally and ventrally yellow with yellow hairs, a little more reddish, or even blackish, towards apex, with a few black hairs on terminal segments.

Legs. Bright yellow or orange, with yellow hairs, a few black hairs on tarsi.

Wings. Veins yellow. Membrane faintly tinted brownish overall, a clearer yellow in costal cell, but not brown on fore border. R_4 (in holotype) almost rectangular, but without appendix.

Length. Body 11 mm.; wing 10 mm.

In the British Museum are the holotype female from Bivak Is., 25.ii.1910, and two females from Rivierkamp, ii.1910 (all Lorentz); two males, two females, 140° E., 3° 10' S., 900-1,800 ft., Jan., 1937-8, and one male, three females, Humboldt Bay Dt., Bewani Mts., ix.1937 (W. Stüber); two males, one female, Waigeu, Camp Nok, 2,500 ft., iv.1938 (Cheesman).

In the School of Public Health and Tropical Medicine, Sydney, one male, one female, Waroo, Finsch Haven (Wagner), and one male, Aru Is., Vesi Is. (Littlechild); one female, Mamberamo, Albatros Bivak, 1926 (v. Leeuwen).

One or two specimens have a shorter radial fork, with more pronounced appendix, with or without dark hairs on the palpi. Stekhoven (1926, p. 451) mentions similar variations in some of the specimens he saw, which he did not consider could be recognized as new species.

CYDISTOMYIA LORENTZI.

Tabanus lorentzi Ricardo, 1913, *Nova Guinea*, ix, zool. 3, p. 400; Schuurmans Stekhoven, 1926, *Trenbia* vi, suppl., p. 447.

This species is bigger, redder on the abdomen, and generally less uniformly yellow than *sol*, but is difficult to define by any absolute characters. Generally the palpi and legs have many more dark brown or black hairs, and the beard in typical specimens is brown. The frons is somewhat broader, if anything slightly diverging towards the antennae, and the callus extends only half-way towards the vertex (in most specimens of *sol* it extends three-quarters of the way or more). Labella of proboscis shorter than in *sol*.

♀. *Head.* Frons proportions 14:16:67, index $4\frac{1}{2}$, almost parallel, but slightly narrower in middle. Callus shining reddish brown (Text-fig. 19). Tomentum of frons greyish yellow, with mainly yellow hairs. Subcallus yellow-brown, with the hairs, including beard, yellow-brown or brown. Antennae (Text-fig. 19): first two segments brown with black hairs, third orange, later segments blackish brown. Palpi pale brown, with dark brown hairs. Proboscis yellow-brown basally, black at tip, labella about two-fifths length of proboscis.

Thorax. As in *sol*, entirely yellow, with yellow hairs (paratype) or, more often, reddish yellow, with orange hairs.

Abdomen. Dorsally and ventrally reddish brown, with orange hairs, which are more brownish or blackish on disc and more yellowish on segmentations.

Legs. Reddish, with mainly black pubescence.

Wings. In paratype, clear, only pale yellow in costal and first basal cells. In most other specimens before me the membrane is more or less stained yellow. Vein R_4 without appendix.

Length. Body 13 mm.; wing 13 mm.

Holotype female from Alkmaar, Oct., 1909 (Lorentz), is in *Natura Artis Magistra*, Leyden. In the British Museum is a paratype from the same locality.

The rest of the material shows a good deal of variation. Specimens are generally darker than the paratype and the wings more deeply stained yellow; the beard is often yellow. It may at some time be necessary to subdivide this material.

In the British Museum: two females, Papua, Mafulu, 4,000 ft., i.1934 (Cheesman). In the Archbold collection: nine females, Bernhard Camp, 150 ft., viii.1938 (Olthof); two females, Bernhard Camp, 1,800-2,500 ft., 5.xi.1938 (Olthof); one female, Bernhard Camp, 150 ft., 23.xii.1939 (? 1938) (Toxopeus); three females, Hollandia, vii.38 (Toxopeus); one female, Bernhard Camp B, 300 ft., 7.iv.1939 (Toxopeus).

In the School of Public Health and Tropical Medicine, Sydney: one female, Papua, Port Moresby, Jan., 1941 (Taylor); one female, Papua, Waria R., 21.i.36 (Littlechild). The latter specimen is much darker even than the rest, and has many black hairs dorsally on the abdomen.

Two females in the British Museum from Wakwa Exp., Dec., 1912, Camp III, 7,500 ft. (Boden Kloss), may represent a new species, but are too shrivelled and denuded to be sure of this. The blackish palpi are more elongate than in *lorentzi* and the frons (partly shrivelled) appears slightly divergent. Terminal antennal segments black.

CYDISTOMYIA CREPUSULARIS, n. sp.

The unique female specimen is greasy, but the bushy, dark brown hair-covering sets it apart from any other *Cydistomyia*. In appearance it resembles the *obscuratus*-group of *Tabanus*, but it is distinguished at once by the bare subepaulets and the broader, parallel-sided frons.

♀. *Head.* Frons proportions 12:13:62, index 5, nearly parallel. Callus small, contracting smoothly into a long median extension (Text-fig. 67). Tomentum of frons dark brown, with black hairs. Subcallus and entire facial area brown, with dark brown hairs, beard dark brown. Antennae (Text-fig. 67): first two segments dark brown with black hairs, rest missing. Palpi dark brown with black hairs.

Thorax. Mesonotum (greasy) very dark red-black, humeri reddish. Black hairs rather long and dense; silky yellow hairs are present, but inconspicuous. Pleura black-brown, with bushy dark brown hairs.

Abdomen (greasy). Dorsum dark red basally, black apically, venter black, both with entirely dark brown hairs; no pale hairs, even on side margins.

Legs. Femora a very dark mahogany-red, black above; tibiae and tarsi black or very slightly brownish. Hairs black.

Wings. Faintly tinted yellowish along veins, costal cell and stigma clear yellow. R₁ without appendix.

Length. Body 12 mm.; wing 12 mm.

The unique holotype female, from Haumo R., val., Milne Bay, 25.iii.1944 (Krombein), is in the U.S. National Museum.

This specimen is annotated: "collected at light", and its sombre appearance is consistent with a crepuscular habit. Possibly it is no more than a melanistic form of *lorentzi* Ric.

OTHER SPECIES RECORDED FROM NEW GUINEA.

I have not recognized the following species, which are recorded from New Guinea:

1. *T. latisegmentatus* S.S., 1926, p. 294. My *bisecta*, n. sp., may be a form of this, but differs in a number of details of colouring. Holotype, from the Lorentz area, is in Natura Artis Magistra, Amsterdam.
2. *T. bipunctatus* S.S., 1926, p. 519. Seems to be close to *nigerrima*, n. sp., but differs in having a narrower frons and callus and in having golden hairs instead of white ones in the abdominal triangles. Holotype, from Idenburg River, is in Natura Artis Magistra, Amsterdam.
3. *T. griseiventer* S.S., 1926, p. 288. A grey species, frons almost parallel, index 4.6. Thorax and base of abdomen grey, rest of abdomen more brownish, but with grey tomentum. Legs brownish. Wings clear, with short appendix. Holotype, from Noord River (i.e. Lorentz R.), in Natura Artis Magistra, Amsterdam.
4. *T. olivaceus* S.S., 1926, p. 453. Closely resembles *Cydistomyia nokensis*, n. sp., but appears to be distinguished by the broader third antennal segment and the shorter terminal segments. The wing tip is browned. Holotype, from south New Guinea, is in Natura Artis Magistra, Amsterdam.
5. *T. albidosegmentatus* S.S., p. 332. Seems to be quite close to *C. aluensis*, n. sp., but differs in having pale, white-haired palpi and pale yellow femora and tibiae. Holotype, from the Lorentz area, is in Natura Artis Magistra, Amsterdam.
6. *T. aroensis* S.S., 1926, p. 448. Close to *oudella*, n. sp., but differs in having darker legs, the black-haired abdominal tergites, and in shape of frons, which is nearly parallel, or converging slightly towards antennae. Holotype, from Dobo, Aroe Is., in Vet. State lab., Buitenzorg, Java.
7. *T. selene* S.S., 1926, p. 292. A blackish species with half-moon-shaped, white abdominal spots. May be close to *aluensis*, n. sp., but has a narrower frons and differently marked wings. Holotype, from the Lorentz area, is in Natura Artis Magistra, Amsterdam.
8. *T. erythrocephalus* Wulp, 1868, *Tijdsch. v. Ent.*, xi, p. 99; Schuurmans Stekhoven, 1926, p. 419. A brown-black form, without a shining frontal callus. It resembles *immatura* and *pseudimmatura*, n. spp., but differs, as mentioned, in the descriptions of those species. Holotype, from Halmaheira, is in the Rijksmuseum of Natural History, Leyden.
9. *T. monocus* Dol., 1858, *Natuurk. Tijd. Ned. Ind.*, 17, p. 85. Wulp, in his Catalogue of the Diptera of South Asia, mistakenly gave the locality of this species as Amboina and was copied by later authors. The correct locality is "Midden-Java (Gombong)", and the species should therefore be struck off the New Guinea list.
10. *T. yulensis* v. Roder, 1892, *Stett. ent. Zeit.*, 53, p. 244. This species has apparently never again been recognized, so I repeat the original description. "Epistoma

yellow-haired. Callus linear, red-black, shining; eyes bare; antennae pitch-black, third segment with distinct tooth; palpi pitch-black, with very short black hairs. Thorax dorsally, including scutellum, pitch-black; breast greyish yellow pollinose and yellow-haired; abdomen brown, with golden hairs laterally: venter brown, hind margins of segments golden. Wings weakly brownish. Halteres yellow. Legs black, hind tibiae with black fringe. Length 21 mm. Habitat: Mt. Yule, N. Guinea."

Note that the locality is not Yule Island, but Mt. Yule, 9,500 ft., on the mainland, 08° 15' S., 146° 40' E.

From its size, linear callus, and generally black appearance, this would seem to be a *Tabanus* near *wollastoni* or *pollinosus* Ric., but neither species has golden hairs on the abdomen as he describes.

11. *T. argentsignatus* S.S., 1926, p. 364. Timor.

12. *T. obtusipalpis* S.S., 1926, p. 498. Mysol Is.

The types of these two species are said to be in the British Museum, but I have not been able to trace them.

ADDENDA TO PRECEDING PART OF THIS PAPER.

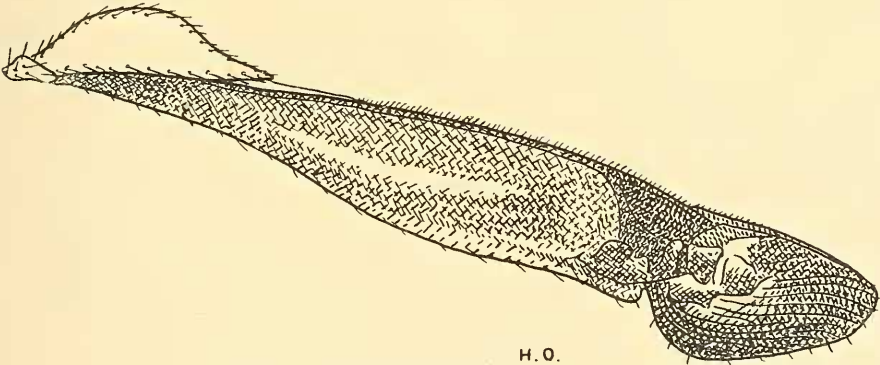
After the preceding part of this paper (these PROCEEDINGS, lxxii, 1947, 125-142) had been sent to press, the following additional information came to light.

SCAPTIA BERNHARDI Oldr.

One female in a collection received from the S. Australian Museum. N. New Guinea, Mt. Lucreu, 2,000 ft., Jan., 1939 (Miss Cheesman).

SCAPTIA MAFULENSIS Oldr.

In a collection from the Harvard Museum of Comparative Zoology. Two females from Morobe Dt., Mt. Misim (Stevens).



Text-figure 71.

Proboscis and palp of *Scaptia flavibarbis*, n. sp.

SCAPTIA FLAVIBARBIS, n. sp.

In the discussion under *S. caliginosa* in my earlier paper (op. cit., p. 134) I pointed out that Schuurmans Stekhoven listed two specimens collected by Wollaston in 1912; that he referred to one of these as Walker's type; and that I failed to understand why he said that the first posterior cell was closed in the type specimen. This was not so in either of the Wollaston specimens before me.

It appears that I had not seen the specimen that he regarded as Walker's type, which has since come to light. It bears a label by Stekhoven "*Erephopsis flavibarbus* Type". Evidently he originally proposed to describe it as new and then decided—erroneously—that it was the type of *caliginosa* Wlk. I have already given an account of the true

type of *caliginosa*, and as this newly discovered specimen is distinct I describe it as new using Stekhoven's manuscript name. Incidentally this specimen does have the first posterior cell closed.

Besides being larger than any other New Guinea *Scaptia*, this species is instantly recognized by a peculiar inflation of the stem of the labium (Text-fig. 71). If only one specimen were available, I would be inclined to regard this as an individual peculiarity, but there is a second specimen from an entirely independent collector. In the key (op. cit., p. 130) this species runs down to *floccosa* Oldr., but is bigger, the palpi are less elongate, the distal wing-band less distinct, and the conspicuous supra-alar tufts of white hairs are absent.

♀. *Head*. Frons and face reddish brown, with yellow-brown tomentum, and rather long black hairs on upper half. Parafacials grey with long black hairs, and a few yellow ones above. Face more brown, with black hairs. Eyes with thick, dark brown pile. Antennae—first two segments brown with black hairs, the following segments bright orange, only a little darker towards tip. Palpi and proboscis as in Text-fig. 71; palpi orange, proboscis black with faint reddish dusting on stem.

Thorax. Mesonotum mahogany-red, with some greyish dusting and short black hairs. Humeral and supra-alar tufts yellow, but not conspicuous as in *floccosa*. Pleura reddish with grey tomentum and yellow hairs, perhaps a few darker ones on mesopleuron.

Abdomen. Dorsally shining mahogany-red, hind margins of segments black, hairs all black. No pale hairs on side margins. Venter similar, rather blacker and hairs longer.

Legs. Fore and middle legs yellow, femora with grey dusting. Black hairs on femora, yellow hairs on tibiae and first tarsal segment. Hind legs brown, with black or brown hairs.

Wings. Basal band well defined, apical band rather faint. Tegular tuft mainly black.

Length. Body 17 mm.; wing 16 mm.

In the British Museum are the holotype female, Upper Utakwa Valley, 5,000–10,000 ft., Feb.–Mar., 1912 (Wollaston), and one female paratype, Wakwa Expedn., Camp iii, 2,500 ft., Dec., 1912 (Boden Kloss).

LIST OF SPECIES OF NEW GUINEA TABANIDAE.

PANGONIINAE.	
<i>Chrysops albicincta</i> Wulp.	<i>Chasmia basifasciata</i> de Meij.
<i>Pareucompsa dimidiata</i> Wulp.	<i>bincta</i> End.
<i>femoralis</i> Ric.	<i>Chasmicella brevisculus</i> Wlk.
<i>Lilaea atriventer</i> S.S.	<i>fasciata</i> Oldr.
<i>de meijerei</i> Ric.	<i>fulgidus</i> Ric.
<i>flavicincta</i> S.S.	<i>ochrothorax</i> S.S.
<i>vittata</i> Ric.	<i>papouinus</i> Wlk.
<i>Scaptia albibarbis</i> S.S.	<i>parva</i> Oldr.
<i>auripilosa</i> Oldr.	<i>parvicallosa</i> Oldr.
<i>bernhardi</i> Oldr.	<i>raffrayi</i> Big.
<i>caliginosa</i> Wlk.	<i>subhastata</i> Oldr.
<i>flavibarbis</i> Oldr.	<i>Chalybosoma luciliaeformis</i> S.S.
<i>floccosa</i> Oldr.	<i>malkini</i> Oldr.
<i>insularis</i> Oldr.	<i>metallicum</i> Ric.
<i>leonina</i> Oldr.	<i>Cydistomyia albithorax</i> Ric.
<i>mafulensis</i> Oldr.	<i>doddi</i> Tayl.
<i>novaequineensis</i> Ric.	<i>aluensis</i> Oldr.
<i>taylori</i> Oldr.	<i>bissecta</i> Oldr.
<i>unilineata</i> Oldr.	<i>caesius</i> Wlk.
	<i>leucopterus</i> Wulp.
	<i>crepuscularis</i> Oldr.
	<i>dimorpha</i> Oldr.
	<i>festiva</i> Oldr.
	<i>heydoni</i> Oldr.
TABANINAE.	
<i>Neobolbodimyia nigra</i> Ric.	
<i>Japenoides cheesmani</i> Oldr.	

Cydistomyia imitans Oldr.
immatura Oldr.
immigrans Oldr.
inopinata Oldr.
laetus de Meij.
lamellata Oldr.
lorentzi Ric.
misimensis Oldr.
nigerrima Oldr.
nokensis Oldr.
oudella Oldr.
pseudimmatura Oldr.
sol S.S.
Tabanus angusticallosus S.S.
angustilineatus Oldr.
approximatus Oldr.
aurivittatus Ric.
ceylonicus Schin.
kershawi Ric.
cinnamoneus Dol.
ceramensis S.S.
cohaerens Wlk.
picticornis Big.
alfourensis Big.
daruensis Oldr.
denticulatus Ric.
divisus Ric.
doreicus Wlk.
sonnerati Big.

Tabanus exagens Wlk.
flammeus S.S.
flavipennis Ric.
furunculigenus Dol.
obscuratus Wlk.
illustris Ric.
indistinctus Big.
infuscatus Oldr.
lenticulatus Oldr.
opalescens S.S.
patriarchus Oldr.
pollinosus Ric.
productus Oldr.
recusans Wlk.
rubriventria Macq.
novaeguineensis Ric.
rufinotatus Big.
designatus Ric.
semicircularis Ric.
serus Wlk.
facilis Wlk.
laglaisei Big.
stüberi Oldr.
truncatus Oldr.
vanleeuweni Oldr.
wollastoni Ric.

The following recorded specimens are of uncertain position:

Tabanus albidosegmentatus S.S.
aroensis S.S.
bipunctatus S.S.
erythrocephalus Wulp.
griseiventer S.S.
latisegmentatus S.S.
olivaceus S.S.
selens S.S.
yulensis v. Roder.

Silvius latistriatus S.S.
atripes S.S.
variegatus S.S.
atratus S.S.